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DYESTUFF REPORTER

Devoted to Textile Chemistry
BLEACHING • DYEING • PRINTING • FINISHING

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Proceedings of the
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*AATCC Research Newsletter No. 14

NEWS IN GENERAL

Leonard S Little, chairman of the Executive Committee on Research, and Charles W Dorn, chairman of the Technical Committee on Research, have jointly announced that there will be meetings of their groups during the Atlanta Convention. Check the convention program and notices for times.

All of us mourn the untimely loss of a friend and fellow researcher, George H Schuler. As AATCC's publicity chairman, George was the ever diligent recorder of TCR doings and abstract editor of annual convention papers.

A recent issue of Corporate Campaigner unfolded a little more of AATCC's corporate membership plans for a big drive to get underway at the Convention. The Campaigner goes to members of the Council, TCR and ECR, research committee chairmen, section chairmen and their corporate membership directors — 174 all told. This group has been brought into co-operation with the Corporate Membership Committee to help principally in supplying names of firms which are likely prospects for membership.

Norris Rabold, Corporate Membership Chairman of the Annual Convention, has lined up a special program for the corporate friends of AATCC research being invited to attend. Assistant secretary Dick Frey is working on a special exhibit on the use of Corporate Membership funds for research and Al Johnson, National Corporate Membership Chairman, is tying in his campaign closely with the convention as noted.

AT RESEARCH HEADQUARTERS

AATCC's reesearch staff has had offered to it the use of a new microfilm viewer recently acquired by the Alumni Library at Lowell Technological Institute. The acquisition of microfilm for AATCC files has been initiated.

Experimental work has been completed on a new test method for evaluating the effect of alternate light exposure and launderings on textiles. The test, believed to more closely approximate actual wear conditions, will be readied shortly for TCR letter ballot.

At the request of the Committee on Colorfastness to Washing, details of a new test which will approximate the results of one 45-minute 3-A Laundering Test by a one-minute treatment in the Accelerotor are being worked out. H E Glidden and Mrs Crane are carrying on the bulk of this work.

COMMITTEE ACTIVITIES

The Committee on Drycleaning Test Methods is assembling a range of fabrics for extensive field tests and subsequent experimntal and inter-laboratory work. The factors to be evaluated are: colorfastness, retention of finish (crease resistance, flame retardants, crispness, etc) and shrinkage. The project is being developed in co-operation with related AATCC committees, selected drycleaning plants, National Institute of Drycleaning and AATCC Laboratories. A minimum of 10 yards (42" wide) is required for each sampling. Get in touch with Al Johnson, chairman, if you have a fabric for this project.

* Published every other issue of the AMERICAN DYESTUFF REPORTER.

G H Schuler

GEORGE H SCHULER, 59, chairman of AATCC's Publicity Committee, died in Delaware Hospital, Wilmington, Del, on July 13th after a long illness.

One of the nation's outstanding authorities in the field of dye application, Mr Schuler was director of the Technical Laboratory of the Du Pont Company's Organic Chemicals Department at Deepwater Point, N J. He had been with Du Pont since 1921, when he started as a dye tester in the standardizing division of the Technical Laboratory. He headed the division the next year and continued in that position until 1934 when he was appointed assistant director of the laboratory, m oving to associate director in 1938. He became director on August 1, 1943, continuing in that capacity until his death.

In addition to his activities in AATCC, Mr Schuler was a member of the American Chemical Society, the Masons, a former president of the Du Pont-Penns Grove Country Club, and he was a council member of the Boy Scouts. He served on the Penns Grove draft board during the war.

He was born October 13, 1894, in Brooklyn, N Y, and got his bachelor of science degree from the College of the City of New York in 1917. Prior to joining Du Pont, he was an analytical chemist with the Amalgamated Dyestuffs and Chemical Works of Newark, N J, where he was in charge of all analytical and standardizing activities.

He is survived by his wife, the former Catherine S Wagner; and two sons, George H, Jr, and Herbert L.

AATCC CALENDAR

COUNCIL
1954—Sept 15, Nov 19.
1955—Jan 21, Apr 15, June 17

NATIONAL CONVENTIONS
Sept 15-18, 1954 (Atlanta Biltmore, Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J; 1956 (New York); 1957 (Boston).

NEW YORK SECTION
October 15, November 19 (Kohler's Swiss Chalet, Rochelle Park, N J); January 28 (Georgian Room, Hotel Statler, New York); February 25 (Skytop, Hotel Statler, New York); March 18, April 22, May 20 (Kohler's Swiss Chalet, Rochelle Park, N J).

NORTHERN NEW ENGLAND SECTION
Oct 8 (Colonial C C, Lynnfield, Mass); Dec 10 (Woodland Golf Club, Auburndale, Mass).

PIEDMONT SECTION
Oct 16 (Hotel Barringer, Charlotte, N C).

PHILADELPHIA SECTION
Sept 24, Oct 29 (Penn-Sherwood Hotel, Philadelphia, Pa); Dec 3 (Kugler's Restaurant, Philadelphia).

RHODE ISLAND SECTION
Oct 14 (Johnson's Dummocks Grille, Providence, R I); Dec 2 (Annual Meeting —Sheraton Biltmore, Providence, R I).

SOUTH CENTRAL SECTION
Dec 4 (Hotel Patten, Chattanooga).

SOUTHEASTERN SECTION
Dec 11 (Atlanta-Biltmore, Atlanta, Ga).

WESTERN NEW ENGLAND SECTION
Oct 1, Nov 12, Dec 10 (Rapp's Restaurant, Shelton, Conn).

(A general calendar of events may be found page 516)

REPORT OF THE STUDENT AWARD COMMITTEE

THE Student Award Committee is very pleased to report that the following students have been presented the 1954 American Association of Textile Chemists and Colorists Award:

Lowell Technological Institute—— Armand Lawrence Greenhall

North Carolina State College—— Donald Canfield Dohner

Philadelphia Textile Institute—— Edmund A Zavaglia

New Bedford Institute of Textiles and Technology —— James Herbert Siddall, Jr

Georgia Institute of Technology—— Enrique S Pels

Clemson College —— William Furman Moore, Jr

Bradford Durfee Technical Institute ——William Herbert Marsden

Fairleigh Dickinson College —— James M Polito

Rhode Island School of Design—— Albert Jacob Strumar

This award is made annually at each of the schools having Student Chapters of the Association, being presented to the outstanding senior in textile chemistry and dyeing.

The award this year was in the form of a technical book as usual, and the Association's monograph on "The Application of Vat Dyes" was chosen as the best volume available. In addition to this useful technical book, each of these young men will receive a free membership in the Association for the next dues year.

The committee wishes to congratulate these recipients on their splendid records, and wish them the best of success in their future endeavors.

H C Chapin
Thomas R Smith
Percival Theel
George H Wood
P J Wood
Joseph Lindsay, Chairman

180th Meeting—

TECHNICAL COMMITTEE ON RESEARCH

THE 180th meeting of the Technical Committee on Research was held in the Hotel New Yorker, New York, N Y, on June 15, 1954.

Those in attendance were: C W Dorn, *chairman;* C A Sylvester, *vice chairman and acting secretary;* H W Stiegler, *director of research;* M J Babey, G L Baxter, S J Davis, P J Fynn, R R Frey, H E Hager, S L Hayes, W A Holst, H Y Jennings, E R Kaswell, G O Linberg, J E Lynn, G Meili, R D Robinson, V S Salvin, C H A Schmitt, W von Bergen, J L Warner, H E Wilde, M Winkler and P J Wood.

The meeting was called to order by the chairman, C W Dorn, at 1:45 pm.

REPORT OF THE DIRECTOR OF RESEARCH

Dr Stiegler reported the following:

1) Completion of new construction at Lowell is progressing rapidly and will increase the available AATCC space by about one-third.

2) Information regarding new test methods and changes in existing methods will be printed on the outside cover of the *1954 Year Book.*

3) A description of the new dynamic immersion absorption test developed at Lowell, employing the steel tubes used for the accelerated series of wash tests, has been written by George J Mandikos and submitted to the Committee on Water Resistance for consideration as a tentative or alternate standard method. (The complete article by Mr Mandikos may be found on page P402 of the June 21st issue of *American Dyestuff Reporter).*

4) A considerable amount of work has been done at Lowell at the request of the Committee on Flammability to provide much needed data.

5) The research laboratories at Lowell are continuing to co-operate with the Washfastness Committee in evaluating the Accelerotor as a possible means for determining the washfastness of colored textiles.

6) The five test methods for bleached cotton goods submitted by the Committee on Bleaching have been submitted for vote by Lowell. Results to date indicate that all five tests are, in general, being favorably received.

7) In accordance with the requirement that reference committees must review their test methods every three years, Charles A Seibert has presented a very thorough analysis of the method for testing "Colorfastness to Chlorine". One question was raised regarding the possibility of increasing the sodium bisulfite (antichlor) concentration from one-half to one percent to insure complete chlorine removal provided the higher concentration does not affect colors. This has been checked on a number of shades and no significant color changes noted. The tests have been forwarded to Mr Seibert for final review.

R Hobart Souther also has reviewed the method for "Accelerated Aging of Textiles Dyed with Sulfur Colors" and has indicated that no changes are necessary or desirable.

REPORTS OF SUBCOMMITTEES

BLEACHING———T E Bell, chairman, reported that five tests for bleached woven cotton goods have been prepared by this committee and distributed by headquarters at Lowell for approval by means of letter ballot. He stated that the committee is making progress in developing a method for determining the whiteness retention of bleached cotton fabric. The committee is also preparing material for publicity release and for a research bulletin covering this work.

WATER ABSORBENCY ——— R B Smith, chairman, reported that this committee had reviewed the results of J B Millor's first set of results on eight different fabrics, both as received and after washing, using the wire screen method. These preliminary results show great promise and the tests are to be continued. A meeting of this committee is planned during the last two weeks of August.

FASTNESS TO WASHING—P J Fynn, chairman, reported that, on the basis of an interlaboratory evaluation, this committee is recommending that the present filament yarns of acetate, nylon and rayon in the six-fiber stain record cloth be replaced with delustered spun yarns of these same fibers for the following reasons:

1) a progressive forward step since most laundered fabrics are made of spun yarns;
2) greater ease of judging the degree of staining because of less light reflection.

Several objections to the present record cloth have been received because of the fact that the present nylon-base fiber is sometimes a color scavenger and becomes more heavily stained than some of the effect fibers. The possibility of using another fiber less susceptible to staining but possessing good fusing properties was discussed. It was voted that a recommendation be given to the stain-record-cloth manufacturer that type 81 Orlon acrylic fiber be substituted for nylon as a base fiber. Mr Fynn also reported that the write-up on the new alternate light and washing test had been completed and was ready for presentation to the Technical Committee on Research for letter ballot. Approval for this step was given at the last meeting of TCR.

The Washfastness Committee has also accepted, subject to approval by TCR, two write-ups prepared by Mr Fynn which describe the significance of both the old series of wash tests and the new accelerated series. These sections would be known as "Interpretation of Results", and would immediately precede the present section on "Evaluation" in the test method. These write-ups were prepared at the request of C W Dorn and are as follows:

COLORFASTNESS TO COMMERCIAL WASHING AND DOMESTIC WASHING
(Test 36-52)

Interpretation of Results

These tests were designed primarily to rate the resistance of colored textiles to the tests and alkalinity conditions encountered in commercial and domestic laundering but are not suitable as consumer end-use tests. Because these tests do not take into account abrasion losses the results are not strictly comparable to what occurs in actual laundering.

ACCELERATED WASHFASTNESS TESTS
(Tentative Test 61-52)

Interpretation of Results

The conditions which are obtained in these tests produce results which have been correlated with the results of actual laundry practice. These are accelerated tests and in obtaining the required degree of acceleration some of the conditions, such as temperature, were purposely exaggerated. These tests are satisfactory consumer end-use tests and the correlation with actual laundry practice is given in the following section of "Evaluation".

COLORFASTNESS OF DYED ACETATE TO ATMOSPHERIC OXIDES OF NITROGEN———V S Salvin, chairman, reported as follows for this committee:

A new lot of gas-fading test fabric and also the vat dyed standard of fading fabric has been processed. These fabrics, which have been approved by the committee and also by Dr Stiegler at Lowell, have been released for packaging as replenishments for Lot No. 4.

In order to standardize future lots of gas-fading test fabrics, details of dyeing and finishing procedures will be recorded in detail and filed at Lowell. A five-pound quantity of Celanthrene Brilliant Blue FFS Conc 200% has been sent to Lowell for use in future lots of test fabric.

Acknowledgment is made to Fair Lawn Finishing Company for their facilities in processing the gas-fading test fabric and to the Du Pont Company for the vat-dyed standard of fading.

The gas-fading test chamber constructed by Cliffside Dyeing Corporation has been evaluated by C A Sylvester and V S Salvin, representatives of the committee. Reference was made to a prior report by Messrs Sylvester and Wernz in which the chamber using generated oxides of nitrogen was not considered satisfactory because the exposed fabrics continued to fade on storage. The Cliffside chamber in the present evaluation has a multi-burner system with a fan to give circulation and to cool the chamber to 120°F. The tests run on various dyes, inhibitors and fibers showed the chamber to give duplicative results, without change on further aging, in the cycle time averaging three hours. The exposed fabrics correlate very well with tests run in the U S Testing Company chamber at times of 12 to 16 hours. Minor differences in tone of fading and yellowing of inhibitor are observed between the short cycle in the Cliffside chamber and the longer cycles in the U S Testing Company chamber. The modification of the present testing procedure or apparatus to give a gas-fading cycle in the shorter periods is an objective of this committee. The Cliffside chamber gives promising performance. The results will be presented to the Gas-Fading Committee followed by a formal report to the Technical Committee on Research and the Executive Committee on Research.

DURABLE FINISHES———E R Kaswell, chairman, gave a brief history of this committee's activities and then discussed plans for future work. He stated that it was recognized that both the Monsanto wrinkle-recovery tester and the American Cyanamid roller tester were laboratory instruments capable of making a specific measurement that may not necessarily reflect actual service conditions. Present plans call for additional investigation on the effect of time of creasing and the rate of creasing reflectance employing both of these testers.

Recently there have been some new instruments and test methods proposed for measuring wrinkle recovery and crease resistance, and the committee feels that these must also be evaluated. Included are Hebler and Kolb's apparatus as well as the Stoll-Celanese wrinkle tester. In addition, there are some alternate instruments available which have not been specifically and thoroughly tried on the wrinkle recovery problem, e g, the Schiefer flexometer.

Finally, the committee believes that relationship between subjective wrinkle resistance as visualized in the mind's eye and compared with quantitative laboratory measurement must be given some attention. The committee is currently considering the design of experiments which will permit a comparison of specific measurements obtained by any of the instruments cited with subjective evaluations in any manner desired by the subjective evaluator.

ANTIMICROBIAL FINISHES———H E Wilde, chairman, gave a progress report covering the work of this committee since it was organized in September, 1952. He stated that, in their first evaluation, pieces of cotton sheeting were treated with seven compounds having protective qualities. These samples were divided and submitted to six participating laboratories for testing with no special care being taken to separate samples during transportation. Each laboratory cut its own samples from the pieces received. Results of this first investigation were most erratic. After an analysis of the results it was decided:

1) to use a heavier grade fabric,
2) to cut off samples before transmission; and
3) to keep all samples separate while handling.

This has been done and the results of the second interlaboratory test program are most encouraging. Five of the laboratories show excellent correlation with the plate test method. The older test methods, however, are still quite erratic. J Schwartz is at pesent investigating a possible synthetic urine media to replace the natural, as the possible variations are, in the opinion of the subcommittee, the reason for the extreme differences.

* * * *

Under new business C W Dorn reported that there has been an increasing demand for more interpretive data regarding the significance of our test methods in terms of end usage. He emphasized that this was not to be misinterpreted as meaning that such data should in any way attempt to indicate tolerances or specifications. The series of accelerated wash tests was cited as an example of what was needed because one of their tests produces results comparable to the average of five commercial or home launderings under specified conditions. The Technical Committee on Research agreed that it should recommend to the Executive Committee on Research that a short write-up be added to each test method describing the significance of the test in terms of end usage. It was pointed out that in some cases it might be possible to recommend the interpretation given in CS 59-44 for some tests giving the necessary credit to this agency.

There being no further business the meeting was adjourned at 3:25 pm.

Respectfully submitted,
C A SYLVESTER,
Acting Secretary

—♦ ♦—

Membership Applications

SENIOR

James F Davis—Dyer, Goodwill Mfg Co, Flomaton, Ala. Sponsors: W W Bussey, E V Helms.

William P Dooley—Dev Service Dept head, American Viscose Corp, Nitro, W Va. Sponsors: J C Woodruff, L S Walmsley.

George C Murphy—Colorist—quality control, National Aniline Div, Chesterfield Plant—Fiber Division, Hopewell, Va. Sponsors: H C Chapin, E E Fickett.

Jorge J Pagani—Head dyer of Sudamtex de Uruguay S A, Solonia, Uruguay. Sponsors: C Z Draves, H Halvorsen.

Eric Silvers—Agent of General Dyestuff Corp, Milan, Italy. Sponsors: G G Neisser, H E Hager.

JUNIOR

Edmond C Campbell, Jr—Salesman, Roma Chemical Corp, Brooklyn, N Y. Sponsors: C M Christiansen, S Wood.

ASSOCIATE

Juan A Masso—Sales Technical Section, R Masso & Cia, Barcelona, Spain.

APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP

John F Cobianchi
George H Fisk
Moises Haimchick
Eric O Herzog
Walter E Kramer
Cesar Manevich
George S Y Poon
Ruedi E Weber
Daniel W Young, Jr

A STATISTICAL APPROACH TO THE SOLUTION OF TEXTILE PROBLEMS*

RAYMOND W JACOBY

Ciba Company, Inc, New York, N Y

A former textile-plant manager talks in a stimulating manner about the practical use of statistics in solving plant and especially printing problems. He points out at the same time how to avoid the fallacies and absurdities that statistics may lead to when employed with more enthusiasm than intelligence. The use of good judgment and the application of humanics in plant operation are emphasized.

WHEN the word *statistics* is used, the first thought that comes to mind is rows of very boring figures. On the other hand, somebody said the other day that statistics are like a Bikini bathing suit — they are very revealing but at the same time they cover very interesting points.

Before one discusses a subject the best thing is to try and find out what it is all about, so I thought I would look in the dictionary and find out just what statistics are. I got out Webster and found about three inches of definition, but the one I liked best was *classified facts.* If we stop and think of statistics as classified facts, then we have something to sink our teeth into right away.

Let us stop and consider from what basis you may view plant problems. It seems to me there are two: fact or fancy.

If we call statistics *facts,* then we can say statistics or judgment. I talked this over with somebody the other day, and he said that judgment is the wrong word to use because judgment implies logic or reasoning, and therefore it should not be used. However, I still maintain there is judgment which is judgment alone, devoid of logic. For instance, suppose a competitor has brought out a new finish. I am running a plant and am trying to duplicate that finish. I make various experiments and finally produce a sample which I think is pretty good. I give you the competitor's sample and mine and say, "Does my effort match this?" There is neither logic nor statistics in that, it is your judgment. So, will you go along with me and say there are two bases for considering any plant problem: statistics or judgment?

Suppose I say to you, "How good is your judgment?" I think most of you would be insulted. You would say it is very good. But is it? Is your judgment good, devoid of logic and devoid of statistics or facts?

Recently the Government Bureau of Census, Department of Commerce, published their figures for the production of broad woven goods in the United States last year. The words *broad woven goods* are used to designate fabrics of the ordinary width, with which we are familiar, and to differentiate them from tapes, webbings, and ribbons, which are called *narrow fabrics.* The production of broad woven goods in the United States last year was over ten billion yards. A lot of you are in the habit of handling yardage, but I should like to ask you quickly — do not indulge in mental arithmetic, do not use statistics — how much is a billion yards? Would it reach from here to New York? From here to Chicago? Here to San Francisco? Here to Tokyo? Or around the world?

I asked that of a group the other day and one man said, "Well, from the way you say it, it must be an awful lot, so I will go way out on the end of a limb, stick my neck out, and say it will go three times around the world."

I should like to ask this group here now, without mental arithmetic, how many of you think a billion yards would go three times around the world? Will you hold up your hands? (Hands were raised). There are only twelve people here who think that; and you are a group of above-average intelligence.

When I saw those figures, I tried to visualize what a billion yards was — just judgment — and frankly I could not. Then I thought I would convert it to miles, but if you start using arithmetic, it becomes statistics. To my amazement a billion yards is over 568,000 miles. We have nothing on this earth to compare that with. Someone in the Hayden Planetarium told me that from the earth to the moon is only 239,000 miles, therefore, a billion yards would reach from the earth to the moon and back to the earth again. When you got back here you would have 90,000 miles left, which would go around the world three times at the Equator, and then you still would have 15,000 miles left. When you have been from the earth to the moon and back again and three times around the world, I do not know what you are going to do with 15,000 miles more of cloth, so let us just call it a remnant.

As there are only twelve men in this group who thought it would go three times around the world, is your judgment so good? I am not insulting you, just trying to get down to brass tacks. Therefore, what do we have left? Just statistics.

Do not feel, however, that I think statistics are everything. Statistics are helpful. They can be used or they can be abused. They can be your servant or your master. If they are your servant, I think you will find them a true and faithful servant; if they are your master, I am sorry for you.

But do not let us accept statistics as a final answer. In the first place, how are they obtained? Are they obtained technically, scientifically, practically? Do they give us a real picture on which we can rely?

A young mother was going to give her baby a bath, and just at that moment the lady next door came in. The young mother filled up the tub, picked up the baby, and was about to put it in. The lady next door said, "Don't you use a thermometer?" The mother said, "I don't need a thermometer. I fill the tub and put the baby in; if the water is too hot he turns red, and if it is too cold he turns blue." That may be one way of determining the temperature, but I think a thermometer would be more helpful.

In the next place, statistics can be absurd. They can be absurd from a standpoint of inaccuracy. Years ago when Amos and Andy were quite popular characters on the radio, Amos, Andy and Kingfish started a taxi business. They were going to divide the profits up three ways, and Saturday night Amos had a date and said to Kingfish and Andy, "I want my one third; how much did we make?"

One said, "We made $24. How much is a third of 24?"

Amos though a minute and said, "17."

One of the others said, "Can you prove it?"

"Sure I can prove it." He said, "You

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take 24 and divide by 3. The 3 does not go into the 2 but 3 goes into the 4 once and you have 1 left. You did not use the 2 so you bring it down here (indicating) and 3 into 21 goes 7, which gives you 17."

Andy said, "You proved it by division, can you prove it by multiplication?"

"Sure, 3 times 17 is 24—3 sevens is 21; three 1's is 3; 21 and 3 is 24."

Kingfish said, "All right, you proved it by multiplication, but can you prove it by addition?"

"Sure, 17 written down 3 times, 7 plus 7 plus 7 is 21 and 1 plus 1 plus 1 is 3, and 21 plus 3 equals 24."

You can have statistics that are absurd because of their *inaccuracy*. You can also have statistics that are absurd because of their extreme *accuracy*.

Nobody would attempt in any way to discount the ability of the European artisan. Nobody would attempt to discredit in any way or question the ability and the knowledge of the European technician or the European scientist. However, they have the idea of accuracy to a point which, in my mind, in many instances, is absurd.

A while ago I was asked to go over to study a big plant in Europe, and, when I came back, Dun and Bradstreet's, who publish Dun's Review, asked me to write an article on my experiences. This I did. I tried to be fair, although I was critical of some things. I was particularly critical of this extreme of accuracy. When I had finished the article and before I submitted it to Dun and Bradstreet's, a man who was the head of a large plant in Europe happened to be in this country, and I spent the evening with him. I told him I was going to submit the article for publication in Dun's Review and would like him to read it and give me his frank criticism because in some ways I was saying a few things against his continent. He came to the point of accuracy, and when he finished it he laid the paper down and said, "I am glad you put that in there; that is what I keep telling them all the time." He went on, "I can tell you of places over there where on the side of the railroad station there is a sign giving the altitude of that place above sea level. It is expressed in meters and carried out to three decimal places." When you realize that a thousandth of a meter is less than four hundredths of an inch is it not absurd to express the altitude above sea level to such a degree of fineness that the presence of a small pebble would make it inaccurate? So we can be absurd from overaccuracy.

We can also be absurd from the standpoint of making a thing overcomplicated. A couple of weeks ago in Providence we had Professor Schwarz of MIT speak at our section meeting, and he told a very interesting and amusing story. He said that a professor of math at MIT was sitting in his living room at home with his 11-year-old daughter one evening listening to a radio program. On the program they told this story and asked the question: There were two men standing two miles apart. They started walking toward each other at the rate of a mile an hour and there was a fly on the nose of one man; as he makes his first step the fly takes off, zooms to the other man, flicks his nose, and keeps circulating between the two men until they meet and squash him between their noses. The fly is flying four miles an hour. How far did the fly fly during the time these men were walking?

The little girl said to her daddy, "How far did he fly?"

"Well," he said, "that is a very complicated problem that involves a lot of calculus and higher mathematics and I will take it in to the office tomorrow morning and figure it out."

That night when he came home she said, "Daddy, have you got the answer?"

He said, "Yes, I took it to the office and three of the other professors and myself worked on it for several hours. The answer is 3.915 miles."

She said, "No, that is not right, Daddy."

He said, "Maybe it might be 3.914 or 3.916."

She said, "Oh, no, Daddy, you're wrong."

"How much is it?"

She said, "Four miles. They are two miles apart, walking toward each at a mile an hour. It takes an hour to meet and the fly is flying four miles an hour; it flies four miles, period." So do not get too complicated because an eleven-year-old girl might show it was not so complicated.

On the other hand, it is possible to get oversimplification. A number of years ago I knew the treasurer of a plant which had been losing money for a number of years, so it hired a very high-grade efficiency man. They were paying him $30,000 a year, and he gave them two days a week. He studied all their operations. Every month he gave them a report. After about a year and three months when it had cost them about thirty-seven thousand dollars I was in the treasurer's office one day and I said, "How is So-and-so coming along with his work?"

"Oh," he said, "he is doing a wonderful job. At last we got a report from him that tells us why we are losing money."

I said, "If you know why you are losing money now you are on the right track; you know what to do to correct it. What did he tell you?"

He said, "He told us it was costing us more to do the work than we get for it."

And they paid over $37,000 to be told that.

If you start using statistics, you will run into some complications. You will find men who feel that, if you relieve them of the use of their judgment, of their authority, and of their ability to base decisions upon their judgment, you are belittling them, belittling their importance and their prestige. That is unfortunate, but it is not true.

In the first place, no man can prosper if he tries to do it at the expense of his company. Secondly, no man can prosper in a job unless his company prospers. If that man can be shown that you are not belittling his judgment, but that you appreciate and value it, and you are giving him a servant and not a master in statistics to supplement his ability, he can become a much more valuable man to his company and to himself.

When I started working in this industry there was a great feeling of secrecy in everything. Within a company, details of operation were not supposed to be told to men. As a result, there were these judgments, these inhibitions built up, and those men were sincere in their ideas. They honestly believed the things they said. But most of us here have seen many preconceived ideas blasted.

For instance, for years, and even today, you see in the literature that glycerin is a humectant in printing. A few years ago the Rhode Island Section in an Intersectional Contest Paper made a thorough study of that point and showed that glycerin as a humectant has very slight hygroscopic properties. It does, however, have tremendous solubilizing action on the leuco compound.

For years mercerized goods have been said to be darker than unmercerized because they absorbed more dyestuff. A study of that was made and reported in the *American Dyestuff Reporter*. A piece of cloth was dyed with tetrabromoindigo, cut in half, and half of the piece was mercerized. When measured in the spectrophotometer, the portion which had been mercerized after dyeing was found to be 29% darker than the unmercerized portion. It was evident that no additional dye was added during mercerizing, but, in order to establish the fact, samples of the cloth before and after mercerizing were analyzed to determine the amount of dye actually present. As tetrabromoindigo contains 55% bromine, a chemical analysis to determine the amount of bromine present would give a measure of the amount of dye on the cloth. Such an analysis showed that both samples contained the same amount of dye, yet the mercerized sample was 29% darker. Subsequent study indicated that the dif-

ference in depth of shade was due to a change in the amount of light reflected or absorbed, rather than from the presence of more dye.

When I started in this industry the Gant pilers for continuous souring and chemicking were being installed. At that time people concerned with bleaching said that the entire bleaching process could not be made continuous as goods had to be kier-boiled under pressure for from 12 to 15 hours, so this portion of the process could not be made continuous. Those men were sincere, they really believed it and thought they had a good basis for believing it, but today there are billions of yards being boiled and bleached continuously by the DuPont System and by the Becco System.

The only way to do, if you believe in these things, is to get the men, sit down with them man to man and make them feel that, if they differ from you, it is their job to convince you or your job to convince them. There is no resentment, no recrimination. You ask them to respect your opinion as you in turn respect theirs, and you reach a common ground.

That brings up another thought. We have talked about judgment and statistics, but the schools and colleges are today instituting courses in humanics — human engineering — because, without human engineering, without humanics, without a feeling that, man to man, you can work together, your statistics and your judgment are absolutely worthless.

I started to work at a time when there was no belief in disseminating information; they believed you should not give out knowledge even to men in your own organization, and I had a lot of arguments with my superiors on this basis. How can we hold a man responsible if we do not tell him facts? You cannot discuss generalities with a man. You may criticize him and say this, that, and the other thing, but if you discuss generalities, where are you getting? You are getting absolutely nowhere.

There is a saying in journalism that one picture is worth a thousand words, and I will say to you, in plant problems one *fact* is worth a thousand words.

If you men are in companies which do not keep their key men advised, I would like to ask any of you in a position to do so, to get a few pertinent facts of the operation of your business and then go to the key men who are responsible for the particular facts that you are considering and get their opinion, get their judgment. I think you will be amazed.

Years ago I took a job with a plant and was told the first thing was to reduce costs and increase profits, as their operations were very unsatisfactory from a financial standpoint.

I started with some statistics to determine where we were spending money and why. I went down into the color shop. The man who was superintendent of printing had been a colorist for many years. He had been superintendent of printing in that plant for seven years. I was interested in saving some money so I said to him, "Fred, our expenses are pretty high. What do you think we are spending in this room a day?"

He said, "I have no idea."

I said, "I know it, but guess."

"Well," he said, "maybe it is $400 a day."

I said, "You think so?"

He said, "I may be a bit high."

I said, "Fred, we are spending in this room over $4000 a day."

One fact is worth a thousand words. If he thought he was spending $400 how much could he save? If he got everything for nothing he could only save $400, which is not insignificant but it quite different from the possibility when one is spending $4000 a day. Just a figure meant more to him than if I talked with him for twenty minutes and tried to bring out some points. One fact is worth a thousand words.

In the dyehouse our water came from deep wells, and it was terrible. It was so hard you had to chew it before you could drink it. We called the dyehouse the merry-go-round. Goods got in but it was almost impossible to get them out. The goods we dyed on the pad we had to touch up on the jig, and vice versa. We got goods in there but it was certainly a problem to get them out. We decided we would use city water because it was surface water and very soft, so we made arrangements to buy it. I got the bill and was dumbfounded. I went to the superintendent of dyeing and said, "Billy, what do you think our water bill is here?"

He said, "We're not wasting water."

I said, "I'm not accusing you of wasting water, just asking you an opinion as to what our water bill is."

"Well," he said, "I own a two-family house, live downstairs and rent upstairs, and I pay $12 a year for water. Of course, we're a business, get better rates, but use more water — I would not be surprised if our bill here was $100 a year."

"Do you think so, Billy?"

He said, "I wouldn't be surprised."

I said, "Billy, the water bill in this room where we are standing is $100 a day."

He said, "What?"

I said, "Billy, every Monday morning I am going to have the meter read and the figure placed on your desk."

In two weeks that bill was down to $50. Again, one fact is worth a thousand words. I could have talked with him for hours about water and he would say, "We are not wasting water."

Now we come to the consideration of new problems. In studying any problem in plant operation the standard way to do is to take the factors involved, list them all, and then keeping all but one constant, vary the other through whatever range desired.

Let us take a hypothetical problem of something you want to study. You have five factors. Factor #1 is to be varied through five different measurements. Your next factor is going to have four variables; the next factor four variables; still another factor five variables; and the last factor is going to have three variables. The only way you can get an answer is to vary one magnitude all the way through while you are holding the others constant. The total number of tests necessary is the product of all the number of variables multiplied together. In this case it would be 5 x 4 x 4 x 5 x 3, or a sum which amounts to 1200.

Suppose you have statistics available on some of those factors and you start to correlate them. (Mr Jacoby illustrated some examples on the blackboard and explained their application to the problem at hand). By use of the information available, the number of tests necessary is reduced to 60.

This may be oversimplification, but I cite it to point out how, if we exhaust our possibilities before we start on any study and then correlate what information we have, we can greatly simplify the amount of work necessary.

I should like to cite just a couple of experiences of my own. When I took a job in a certain plant, one of the first things I did was to get the chief engineer and say to him, "I want you to bring me a list of every machine in every department and the circumference of every roller on those machines over which any cloth passes." In a few days he brought me the figures. It was not long after that they called me in the make-up room and said they had goods with holes in them. I went to where the cloth was spread out. I measured the holes and found a thirteen-and-a-quarter-inch repeat. I looked at the sheet and said to one of the men, "Get So-and-so here." He was in charge of one of the departments.

This was in the days when we used to call rayon "artificial silk," and we called it the silk-finishing department. When he came in, I said, "Here's this repeat hole, look at your silk winder."

He was a hot-headed man and said, "Why pick on me?"

I said, "We're not going to talk about it, you go look at the silk winder and come back and then we will talk about it."

He left and in a couple of minutes came back and said, "I want to apologize for what I said." He added, "There's a roll on my silk winder made up of pieces of wood screwed onto a central core; the screws were countersunk and had little plugs. One of the plugs came out and the screw had worked out and it was cutting the cloth."

I said, "Your first reaction was that out of a clear sky I picked on you. Here is a list showing the circumference of every roller in the plant; there is only one machine in the plant with a roller thirteen and a quarter inches in circumference. I would have bet you $1000 to a nickel that it was that winder and had to be, but you felt that for no particular reason I was picking on you."

Another example: In those days we did not have blanket washers, and we had to run a yard of back-grey cloth for every yard of cloth we printed. Our cost for back greys was high, and, as I say, I was penny-pinching, so I tried to find out why it was. I had it broken down into costs of washing and drying and the cost of the back greys bought per yard of goods printed.

We bought two other grades of higher-quality cloth, five thousand yards of each and then took five thousand yards of these three grades, had them made up into rolls and ran them time after time, keeping a record of each roll and the number of times it was used. When they all were finally worn out, the most expensive grade was found to be by far the cheapest per yard of cloth printed, and we adopted it.

It was not long after that the manager of another mill called me one day and said, "I would like to borrow a few rolls of back grey." We sent a few rolls to him. The next day he telephoned me and said, "You fellows must think you are Tiffany, judging by the quality of cloth you are using for back greys." I said, "Mac, have you got your figures on yards of cloth printed per yard of back grey purchased? Have you got your cost per yard printed?"

He said, "No, but I will get it."

I said, "You get it and we will get together tomorrow." We did, and while we were paying a lot more per yard than he was for back greys purchased, our cost per yard of goods printed was much less than his. That was arrived at solely by statistics.

Today, in the operation of a plant, you have three general items of cost: labor, material, and overhead. You cannot do much about overhead; and you cannot do much about labor, as a lot of you men know. In several plants which I have checked, their material cost was running between 25 and 35 per cent of the total cost. In plants I have been in this past week material costs ran from $30,000 to $60,000 a week, which is a lot of money. There you have a chance really to effect savings.

Consider the question of printing. As you know, most textile printing is done by the intaglio method whereby the pattern is etched out below the surface of the roller. The engraving is of various depths, and with a certain depth a certain amount of color is applied. The average engraving today will run between three and a half and eight and a half thousandths of an inch.

I was in a plant just the other day looking over figures and having the engraving sheets checked. I saw one combination in which the engraving depth was 8½ thousandths of an inch. As the color cost was 17.84 cents a yard, each thousandth of an inch represented two cents a yard for color.

I know that a lot of printers are going to say right away, "The gauge of the doctor you use, the way you file your doctor, the way you apply it to the roller, the conditions of your lapping, the type of your blanket, the condition of your back grey, the amount of set, or whether you have a wash blanket will all affect the amount of color you apply." I do not deny that.

I talked to a colorist the other day after I obtained these figures and cited these facts. He said, "Well, if we made it a thousandth of an inch shallower I would have to make my color that much stronger." I gave him credit for believing that. I am not belittling that man. He is sincere, but facts are otherwise.

At the Atlanta Convention of the AATCC in 1948 Elliot Broadbent, manager of Glenlyon Print Works, gave a paper on "Textile Printing, Skill or Mystery?" It is in the November 15, 1948 issue of the *American Dyestuff Reporter*. I would like to read part of that paper. I think any of you concerned with printing ought to get it out and read it all:

"Some of the differences in practices from plant to plant are simply amazing. I recall one instance where we had a large run of a certain pattern. This run was so large that we had two sets of rollers engraved. Upon engraving the second set of rollers, we had the engraving made shallower in order to save color. Some time later we had a terrific backlog of work, and asked another plant to print some of our goods for us. We gave them an order calling for this particular pattern. As we also had orders on the same pattern to print at the same time, we gave them the deeper set of rollers and kept the shallow rollers for ourselves. You can imagine our surprise when a couple of days later the manager of the other plant asked if we would give him permission to deepen the set of rollers which we had sent him."

The rollers were too deep for one plant, but the other plant wanted to deepen them. There is judgment versus statistics. Let us come back to statistics on that particular case. I went into the details and got the following information so I would be talking facts and not generalities.

With the first set of rollers engraved, the engraving was six and a half thousandths of an inch deep. They printed over 800,000 yards on the first lot. That is enough to give a good figure of color cost. The color cost was 5.09 cents a yard. The second set of rollers was engraved five thousandths of an inch deep. The next order was for over 600,000 yards and the color cost with these rollers was 3.78 cents a yard. That is 1.31 cents a yard difference on the same pattern for the same customer, so you see we can err on the judgment side.

As I say, if we start talking statistics with people who rely upon judgment, their feelings are going to be hurt, but let us talk to them of facts, man to man, and make them realize that we are working for a common goal.

I was talking to a printer the other day and his company keeps very close records of everything. Many plants that keep records have their records accumulated at the end of the month, and it comes to the manager the second or third week of the succeeding month; but this man told me that every day with every pattern completed in the print room, with every shade completed in the dyehouse, the costs are on his desk the next morning, so that it is fresh in everybody's mind. If he waits until the second or third week in the succeeding month some of his information is four, five, or six weeks old. Secondly, it gives him a chance to do something before another lot of the same shade is dyed or before that pattern is reprinted.

Here are actual figures from plant cost records I saw of a pattern which had been printed. The cost of color was 6½ cents a yard. When they saw that they immediately figured it was high. They had the rollers sent to the engraving shop and polished, and this, as you know, means taking the surface down as when you polish a roller the engraving becomes less deep. The second time they printed it the color cost was five cents a yard. Still they did not like it and had it polished again. On the third printing the color cost was four cents a yard.

So, in spite of somebody saying, "I have to make the color stronger, I have to put another gauge doctor on," I am not

(Concluded on Page P505)

MAN-MADE FIBERS IN FASHION*

CAROLINE BOYER

Textile Research Department American Viscose Corporation

Science today brings us curtains that require little ironing, skirts with permanent pleats and even a man's suit that can be laundered. Fabrics in fashion, even ere Cleopatra, were exclusively of romantic and luxurious silk. However, for the past decade Dame Fashion has had the opportunity to muse and choose from the kaleidoscopic fabrics created from fibers engineered by man. This presentation includes acetate, Acrilan, Dacron, Dynel, nylon, Orlon, rayon and Vicara.

Fabrics containing fiber blends are now fashion news. One of the stimulating jobs widening the scope of applied research is the fact that a specific fiber property inherent in one of these newer fibers cannot necessarily be transposed in whole to a fabric. Perhaps functional values have been overstressed. Greater maturity in fabric design effecting aesthetic appeal and improved fiber-to-fabric techniques are requirements for progress.

Significant is the role of chemistry in modern textiles. Likely by 1960 additional fibers chemically produced will augment the textile family. With these developments, your Association will continue to show leadership and thus stimulate progress by pushing forward engineered applications of these modern fibers.

INTRODUCTION

FIBERS, fabrics, and fashion offer fascination to the American woman who is well known for her fashion consciousness and also for her purchasing power in satisfying her family's needs. To the chemist, the dyer, and to the textile engineer, this fascination serves to motivate his efforts in the interest of textile progress. However, rewards come only to those who are willing to exercise initiative and vision and to those who possess fortitude plus patience. The fashion designer nurtures ideas and creates news, and the contribution made is vital in maintaining leadership in the American fashion and fabrics industry. The fashion designer can be and often is a significant element in sales appeal. To the fashion designer who creates a certain "look" interpreting a certain way of living, these man-made fibers with their ease-of-care features can offer vitality; a better acquaintance of these fibers by the designer can stimulate new consumer demands. These fibers, when intelligently translated into fabrics, fit beautifully into the picture of modern living. However, have the functional values been overemphasized? What interest and what pride can each of us have in our wardrobes if contented with solely functional appeal? Fabrics that are luscious and mellow, fabrics with that soft drape, fabrics with textures to suit our fancy, these aesthetic values must not be lost. The gimmick value of the so-called "miracle" fibers has vanished. Greater maturity in fabric design and improved technological methods in processing the newer fibers are essential requirements to keep the American woman fashionable in clothes which are both beautiful and functional.

Often heard, and true, is the thought that fashion begins with fabric. The art of fashion is not dependent on color and line alone. Instead, the imagination of the fabric designer plus successful fabrication stimulate and satisfy your desires and mine for individuality in the clothes we wear. Fashion in fabrics is everywhere, and today, fibers are in fashion everywhere. Not only in our clothes but also in our homes we enjoy lovely textured carpets, draperies, and upholstery. Fiberwise and colorwise, let us not overlook fashion in the automobiles of today. There is complete co-ordination of metal and fabric styling incorporating functional features contributed by man-made fibers. The garments, fabrics, and household items on display illustrate some of the major end uses of the following man-made fibers commercially available today: acetate, Acrilan, Dacron, Dynel, nylon, Orlon, rayon and Vicara.

FIBER AND FABRIC PROGRESS

These newer fibers, chemically created, are pushing wider and wider the textile horizons even to such breadth that you and I can only imagine future possibilities. Penetration of the textile industry by the men of science is as a wedge gradually opening entirely new dimensions in the sphere of fashion. The fashion business is always one of change, certainly so with today's fabrics created from the fibers produced from such raw materials as petroleum, wood, cotton linters, natural gas and corn protein. Actual proof that ladies hosiery could be made from a filament yarn molecularized from coal, air and water was strictly electrifying in 1938. In the next few years American women were content to stand in line to purchase a pair of these precious stockings. Since then, of course, these stockings have become "the fashion" — sheer, filmy and plentiful.

For decades, silk hosiery was glamorous, warm and plentiful. The silk worm, if kept comfortable and happy in his cocoon, supplied the necessary filaments. It is estimated that in three days, two continuous filaments were spun totaling 800-1000 yards. With the proper climate and cultivation, nature requires weeks to mature one inch of cotton and months to grow 4-5 inches of wool on a sheep *(1)*. By contrast, man transforms a chemical solution into yards of textile yarn in a mere minute. In spinning certain fibers, speeds of 1000 yards per minute are achieved. It may be of interest to note that, as of October 1953, there were 67 fiber-producing plants in these United States. Virginia has 9 plants and Pennsylvania is second with 7 plants. These figures include plants operable in 1953 plus plants under construction *(2)*. In this 24-hour period, approximately 3 million pounds of fibers created by man are being produced. These plants are located along the eastern seaboard states from Massachusetts to Florida, going inland as far as Alabama and Tennessee.

Fascinating fibers are all around us today from the automobile seats we sit on, to the rugs we walk on, and now even to the sheets we sleep on. Just how does a chemist produce a fiber which, when converted into a fabric, will dry quickly, or will not shrink? Hooking up long-chain molecules and building up complicated structures is not so simple. In creating these fibers for you, the raw material must be available in ample supply, and it must be priced right.

Acrilan cannot be produced in a rayon plant nor Orlon in a nylon plant. Each requires custom-designed equipment and set procedures peculiar to each fiber. Similarly, Ford automobiles are not produced in a Cadillac plant nor Chevrolet cars in a Chrysler plant. Certain autos have special features, such as power brakes and automatic transmissions; others are built strictly for economy. Similarly, man-made fibers are versatile and permit the textile technologist to choose the fiber or fiber blend he wishes to use for his yarn and fabric.

Fiber progress through science and intelligent co-operation by the weavers

* Presented before the New York Section on Ladies' Night, Friday, May 14, 1954. The ms was rec'd on May 7 by the Editor of Proceedings and on June 9, 1954, by the *Am Dyestuff Reptr.*

and knitters have brought to the homemaker fabrics and garments which dry quickly, which require little ironing, which do not attract moths, and which hold pleats rather permanently. The "no-iron" feature has served as a sales appeal in merchandising and also as a time saver for the homemaker. In some cases it has brought disappointment. For instance, there may be a difference in the ironing behavior of a fabric before and after it is converted into a sport shirt. The number of stitches per inch and other tailoring techniques may often influence the degree of ironing required for the garment to be wearable.

Fabrics in fashion, even ere Cleopatra, were exclusively of romantic and luxurious silk. However, for the past decade, Dame Fashion has had the opportunity to muse and choose from the kaleidoscopic fabrics created from fibers engineered by man. On display are a group of marquisette curtain fabrics, most of which require little ironing. In this group is a solution-dyed acetate marquisette, a Dacron marquisette, a nylon marquisette, Orlon marquisette, and a rayon marquisette. "Solution-dyed" refers to the method of adding color to the spinning solution as the yarn is spun. Such color is an inherent part of the fiber and exhibits unusual color fastness to most elements. This will be discussed in greater detail later in this presentation. On the retail counter you may take your choice of marquisette curtains made from at least 6 different fibers. Is it price alone or is it the ease-of-care appeal which is most important? If you are buying curtains for a sunny bedroom you may desire the sun-resistant type. The next group on display include taffeta, tricot jersey, pucker-type and crepe fabrics. The third group includes spun jersey, shirting, linen-type, pile, flannel, and suiting fabrics. Suiting fabrics offer a wide range of features, such as shape retention, washability, longer wear life, wrinkle recovery, and lightness of weight. New combinations of textured yarns and colored yarns offer the fashion designer possibilities for exciting creations.

From fiber-to-fabric-to-garment-to-retailer-to-you, is a route that may emphasize quality at every turn; on the other hand, the route may be haphazard and ultimately disappointing. The consumer has little means of knowing if she is buying a quality product unless she buys by brand name or unless the item purchased has an informative tag. Only if each textile operation, including dyeing and finishing, is carried out to best advantage in relation to the fiber and to the yarn and to the fabric construction can a quality garment give the consumer satisfaction for the price paid. Yarn and fabric construction and dyeing and finishing procedures are challenging variables which must be carefully controlled and understood by those who plan and produce fabrics and garments. Merely making fabrics that the cutter will buy should not be the sole objective of any textile mill. Pride in producing satisfactory fabrics and garments should be shared by all participating segments of the textile industry. With this pride, progress can be accelerated.

In certain garments a range of fiber properties is desirable, while in others one or two properties are important. Colorfastness to sunlight is not very important for either mattress covers or coat linings but is necessary for curtains, play clothes, and bathing suits. This particular bathing suit (solution-dyed acetate) has hidden virtues with or without the bathing beauty! Of course, the designer was clever in making possible so much exposure of the beauty! Textilewise, the outstanding virtue is that the color is sealed in the yarn. Thus color is immune to sunlight, perspiration, sea water and to water containing chlorine. This color can be as good as or better than a vat dye. This means that solution-dyed yarns, whether acetate, Dynel or rayon, can meet the requirements of the AATCC rating system and will assure the retailer and the consumer that supreme degree of colorfastness heretofore unobtainable. No longer need the homemaker be disappointed in purchasing garments which do not possess the colorfastness she desires. Solution-dyed yarns are an outstanding research achievement of recent vintage.

As an illustration of the vital job that your association is accomplishing in maintaining standards for color, selected slides will now be shown to acquaint the ladies present with a few AATCC standards.

Generally classified, the man-made fibers, including the recent and more recent, have individual traits, which make their contributions to both functional and aesthetic properties in fabrics, and consequently in the garments we wear. This paper would be too lengthy as well as repetitious to describe each fiber's characteristics. Many papers have been written and many speeches presented reporting the family history and personality of each fiber. As the garments and the household items on display are shown individually, the particular contribution by fiber will be stated.

Briefly, in the realm of up-to-the-minute achievements, solution-dyed fibers of acetate, Dynel, and rayon are real news. Truly washable rayons with increased wear life are now commercially available and offer the homemaker rayons with shrinkage control.

Recently it has been announced that Acrilan possesses improved dyeing characteristics, and special dyeing equipment is not required. Dacron continues to exhibit unusually high wet and dry resilience. Orlon contributes a soft luxurious feel to fabrics, as does Acrilan. Now, nylon yarn can possess an opaque quality providing better covering power. Nylon, Dacron and Orlon have improved dyeability. A new, highly crimped Vicara staple has emerged in 1954 providing bulkier textures in knit and woven blends. Most of the newer man-made fibers marketed since nylon's birth in 1938 offer resistance to shrinkage in laundering due to their hydrophobic or dry property. Incidentally, resistance to moths is a common property of all of the man-made fibers.

BLENDING RELATED TO FASHION

One of the stimulating jobs widening the scope of applied textile research is the fact that a specific fiber property inherent in one of these newer fibers cannot necessarily be transposed in whole to a fabric woven or knitted from this specific fiber. Furthermore, the degree of stability, or resilience, or abrasion resistance, contributed by a specific fiber in a given fabric cannot be absolutely ascertained by even repeated laboratory tests. Technological "know-how" has not as yet advanced to this desired level of achievement. Time plus consumer wear is the combination needed for evaluation. In other words, a prescription calling for carefully mixed fiber components does not always mean the resultant fabric is desirable in every aspect. The basic purpose of blending compatible fibers or yarns is to combine the excellent qualities of each with the pleasing effect of obtaining an improved fabric, functionally, aesthetically, or both.

Blending fibers is not an art. It is not the same as blending selected herbs, salad oil, and wine vinegar to suit the taste. To the skillful chef, gay imagination and the tongue can soon test the flavor of the salad dressing and quickly discern its palatability. With fabrics that are both pleasing and functional, generally the ingredients must be carefully compounded days and even months ahead. Blending is not an art but a science challenging the accumulative knowledge as well as the imagination of the fabric designer. He is wise who is intimately acquainted with each fiber's personality. With this intimacy he is qualified to plan and to create an engineered fabric. Intelligent blending of man-made fibers with each other or with natural fibers may contribute the following effects in fabrics:

1) Greater stability and less shrinkage.

2) Better abrasion resistance and wear life.

3) Better resistance to chemicals, mildew, sunlight, bleaches, moths.

4) Improved softness and lightness of weight.

5) Increased strength.

6) Shape retention and that "bandbox" fashion look.

7) Versatility of color and texture combinations.

By now, some of you may be wearing pleated skirts of fabrics woven or knitted from Acrilan blends or Dynel or Orlon blends. No doubt most of you have placed these pleated skirts in your washing machines and have enjoyed the ease-of-care feature in that little ironing is required. There have been instances of improper pleating translated into consumer dissatisfaction. Such instances could be related generally to carelessness or to lack of information in pleating the fabric. Temperatures too low or exposure time too short in the procedure will not do the job right.

Pleated skirts containing acrylic fibers require a certain simple technique in washing to assure the retention of sharp pleats and to minimize the addition of wrinkles, which are undesirable. Drycleaners, likewise, for best results should modify their techniques so as to prevent unwanted wrinkles and to retain the sharpness of pleats. In laundering, the skirt requires simple dipping up and down in suds, two rinses, and at all times lukewarm water. Remove the skirt from the rinse water and hang on the hanger or on the line to drip-dry. This drip-dry procedure is essential for retaining sharp pleats in fabrics containing acrylic fibers.

Textile progress, through science, brings you, and every other consumer greater enjoyment from these fabrics engineered with a special end use in mind. In this decade alone, textile progress through science has contributed easy-to-care-for, moth-proof, lightweight and longer-wearing garments. Then too, this so-called progress has brought dissatisfaction in certain items where certain fibers may, as yet, not have found their exact places or earned their full rights to be used freely. Keep in mind that experimental or premature fabrics in garments which may occupy a space in your wardrobe are soon removed from the market because of repeated dissatisfaction. Keep in mind, Orlon, Dacron, Dynel, Acrilan and Vicara are man-made fibers that are still growing up. Nylon, now 15 years old, is maturing and is well established. It has travelled the road of both favor and disfavor. The discriminating weaver and knitter is well acquainted with its advantageous textile applications. Time will also mature, or screen out, these newer fibers.

CONCLUSION

Significant has been the role of chemistry in the development of modern textiles. Examine color and its influence by chemistry. Color has matured considerably from the use of berries as dyes in ancient days to the modern dyehouse and to solution-dyed rayon, acetate, and Dynel fibers and yarns. About two centuries ago, color in the form of printed cotton fabrics from the East intrigued French women of fashion. Their fascination reached such heights that French manufacturers of silk and wool felt the pinch and protested so successfully that the Comptroller General of France prohibited the importation of these gay cotton prints. Seventy years later the importation was again permitted *(3)*. Since then, those associated with the textile industry have learned that improvements built into fabrics by textile chemists and colorists are likely to overcome stubborn obstacles, thus winning acceptance from both the trade and the consumer. You can feel assured that as fiber and fabric developments mature, the members of the AATCC will be active participants and leaders in chemical progress related to the textile industry.

The final pattern of man-made fibers in fashion has not been cast. Expect changes in fibers and fabrics and ultimately in the care of garments. It has been said that "the degree to which man-made fibers will continue to grow and to prosper is dependent upon the successful utilization of their chemical and physical characteristics and flexibility of form in products of everwidening consumer appeal" *(4)*. These newer fibers have been created by the chemist's knowledge and persistence, by the textile engineer's perseverance and foresight, the designer's imagination fired by America's freedom of mind. All are giant contributions to America's industrial progress.

REFERENCES

(1) Bouvet, R, "Evolution in Textiles", Paper presented to American Chemical Society, Parkersburg, W Va, April 13, 1954.

(2) Textile Organon, p 147 (Sept, 1953).

(3) Burkart-Shier Chemical Company, "The Role of Chemistry in the Development of Textiles".

(4) Quig, J B, and Dennison, R W, "The Complementary Nature of Fibers From Natural and From Synthetic Polymers". Paper presented at the meeting of the Textile Research Institute, Novembr 13, 1953.

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1953 Intersectional Contest——

A STUDY OF THE EFFECT OF TEMPERATURE AND HUMIDITY ON THE LIGHT FASTNESS OF SYNTHETICS IN THE FADE-OMETER*

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The purpose of this paper was to determine what influence heat or humidity may have upon the light fastness of dyestuffs applied to different synthetic fibers and wool. The fibers studied were, in a first group, those that can be dyed with disperse (acetate) dyes, namely, acetate, Dacron, Dynel, Orlon, and nylon; and, in a second group, those that can be dyed with acid dyes, namely, nylon, Acrilan, Vicara, and wool.

More than 1300 samples were exposed in a special research-model Fade-Ometer, in a regular FDA-R Fade-Ometer, and in daylight. The special Fade-Ometer made possible exact control of temperature and humidity. The tests covered three temperatures—135, 155, and 175°F—and three relative humidities—35, 50, and 65%—in the special Fade-Ometer. The daylight exposures were made in the new weather-proof exposure cabinet. Comparisons of AATCC, British, and German light standards were made concurrently. All results have been checked with the new proposed International Geometric Grey Scale.

The final results, which indicate that temperature affects fading more than relative humidity, will undoubtedly be of great value in designing a new commercial Fade-Ometer that will give results for all dyes and all fibers consistent with sunlight or daylight exposure.

INTRODUCTION

As the newer synthetic fibers have become more widely used, many instances of variation in fastness ratings between Fade-Ometer and sunlight have been reported. Previous work has noted great differences in ratings on many dyes brought about by changes in relative humidity and temperature in the atmosphere surrounding the test sample. It is therefore natural to suspect that these may have an equal or perhaps greater effect in the case of the synthetics.

Investigations by Morton *(1)* noted in general that higher temperatures increased the rate of fading, while variations in moisture content gave variations in fastness ratings of certain dyes.

Smith *(2)* noted, in tests on viscose rayon, that moisture in combination with other factors can produce an effect on the rate of fading of some dyes which can be very considerable.

Lead *(3)* found that humidity changes may produce a much greater effect on the rate of fading than those produced by the difference in spectral distribution between natural sunlight and that of the enclosed carbon arc. He further emphasizes that accurate measurements made at the US Bureau of Standards show that an increase in temperature, with relative humidity remaining constant, increases the fading. He also suggests that little accurate information on the effect of temperature is available and that further information on both temperature and humidity is desirable.

Vickerstaff and Tough *(4)* suggest that a closer specification of exposure condition be established. This should include a definition of the temperature and the humidity of the atmosphere surrounding the exposed sample.

Very little information is available from previous work with regard to definite humidities or temperatures or relative to more than one or two fibers. Even less is available regarding the new synthetic fibers. Therefore, we felt it would be well worth while to conduct a series of tests at definite and controlled humidities and temperatures. We hoped these tests would indicate what effect, if any, was caused by variations in temperature and humidity in the rate of fading of synthetics in the Fade-Ometer. We also sought further indication as to whether any fading noted might appear to be a property of the individual fiber or of the individual dyestuff. It was further hoped that any definite results obtained might suggest changes in operational techniques to make the Fade-Ometer test more uniform and accurate.

EXPERIMENTAL

The synthetic fibers selected for test were broken up into two groups. One of these could be dyed with acetate, or disperse, colors. The other could be dyed with acid colors. These two groups are as follows:

Group 1) Acetate, Dacron, Dynel, nylon and Orlon (Type 41).

Group 2) Wool, Acrilan, nylon, and Vicara.

Although acetate is a more familiar fiber, it was included in Group 1 for checking purposes against other less familiar fibers in that group because the dyes suitable for use on fibers in Group 1 have long been in use on acetate.

Wool was included in Group 2 for checking purposes against the other less familiar fibers in that group because dyes suitable for the fibers in Group 2 have long been in use on wool.

Nylon was included in both groups to serve as a cross check when dyed with dyestuffs selected for both groups.

Yarn made from each of the fibers in Group 1 was dyed a light shade and a dark shade to about the same depth for each fiber but not necessarily with the same amount of dyestuff. The dyes used were three widely used acetate dyes, Celliton Fast Blue FFRN Ex Conc (Pr 228), Nacelan Fast Yellow CG (Pr 242) and Celliton Fast Pink RFG. These were applied by accepted methods in commercial use.

Yarn made from each of the fibers in Group 2 was likewise dyed a light and a dark shade to about the same depth for each fiber but not necessarily with the same amount of dyestuff. For this group, three well-known and widely used acid colors were selected as follows: Anthraquinone Blue SWF Conc 150% (Pr 12), Sulphon Yellow RS Ex CF (Pr 187), Pontacyl Fast Red AS Ex Conc (CI 176).

All of the dyeings were prepared on yarns made from staple fiber as close in

* Presented by M G Morris at the Conrad Hilton Hotel in Chicago on Saturday morning, Sept 19, 1953. Ms was received by the American Dyestuff Reporter on June 9, 1954.

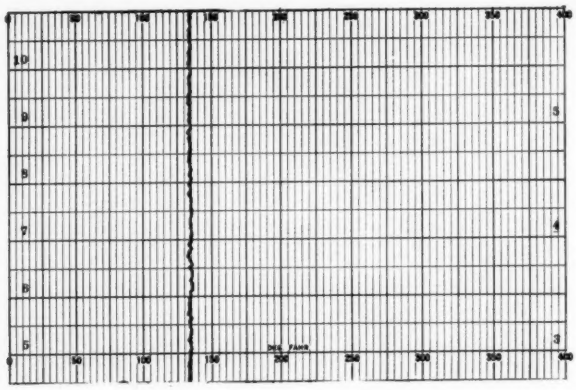


Figure 1
Black-Panel Temperature Recording
Test condition 135°BP at 50 percent rh Research Fade-Ometer

size to each other as it was possible to obtain and comparable in size with 1/28'S worsted. The yarn was then knit into tubes on a 2¼-inch diameter, 116-needle, 48-gauge, latch-needle, circular knitting machine. These tubes were made smooth and flat by wetting out, boarding and drying on an internally steam-heated 2½-inch flat aluminum swatch form. In addition to the tubes made from dyed yarns, tubes were also made up from each of the undyed yarns. While we considered flat-woven samples, we believe better uniformity and evenness of penetration of the dyestuff was obtained by knitting dyed yarns than we could have obtained by piece dyeing. No instances of undesirable light reflection were noted. Previous work *(5)* in "A Study of Effects of Fabric Construction and Mercerization on the Light Fastness of Vat Dyes" indicated that "light fastness is a characteristic of the dyestuff itself and is apparently unaffected by fabric construction."

Each of the samples, prepared as described above, was exposed under a wide variety of conditions in a Special Research-Model Fade-Ometer as well as in the commercially used Model FDA-R Fade-Ometer. The Special Research-Model Fade-Ometer used in this work, while not identical, employed most of the same features as the machines described by Seibert *(6)* and by Boor and Tucker *(7)*. This special research model employs an elaborate system of very sensitive control and regulating equipment. It is well suited for research work in which close control of the various factors affecting fading is desired within narrow limits but over a wide range. However, it is far too elaborate and the instruments and controls are much more sensitive than would be desirable for routine work.

More than 1300 specimens were involved in our tests and required an exposure range of from 6 to 144 hours to produce an appreciable color change on all of the dyeings. Therefore, it was decided to limit the number of exposure conditions in the research machine to three temperature conditions and three relative humidities. The temperatures selected were 135, 155 and 175° F as measured by a black-panel thermometer unit. That unit, as described by Seibert *(6)*, has been found to be more indicative of specimen temperatures since the reading obtained is influenced by the absorbed, transmitted and reflected radiation, and by the temperature, relative humidity and volume of air passing over the specimens. For this work a thermocouple was substituted for the thermometer in the black panel. Through an electronic system, black-panel (BP) temperatures were recorded continuously throughout the test as the black panel and specimens were rotated around the arc lamp at 3 rpm. Figure 1 shows a portion of a typical chart of the black-panel temperature recordings during one of the tests. The small deviation noted indicates how closely specimen temperatures were controlled in this Special Research-Model Fade-Ometer.

The three values of relative humidity selected for this work were 35, 50 and 65%. These were selected as typical and within the limitations of the equipment over the temperature range covered. It was originally planned to include 20% relative humidity, but time available to the Committee in the equipment did not permit it. Relative humidities were calculated from wet- and dry-bulb temperatures, which were recorded continuously at the point of exit of the air from the test chamber. Figure 2 shows portions of typical wet- and dry-bulb charts from which the relative values were obtained.

The Special Research-Model Fade-Ometer was equipped with the same enclosed violet carbon-arc lamp and with the specimens at the same distance from the arc as in the Model FDA-R Fade-Ometer. The lamp for all nine test conditions was operated under the same conditions in order to eliminate variations due to the light source. The arc was operated from a power source in which line voltage was controlled within ± 1 volt. Figure 3 shows a portion of the charts showing the arc voltage and amperage of the lamp during these tests. For the work in the research machine, the arc lamp was adjusted so that its wattage rating and likewise the total amount of radiant energy produced was slightly higher than that of the arc lamp of the Model FDA-R used in this work. This was done so that the fading rate would not be too low at the lower temperature. That will account for the ratings of the specimens exposed in the Model FDA-R being slightly better than those of comparable temperatures and humidities in the research machine.

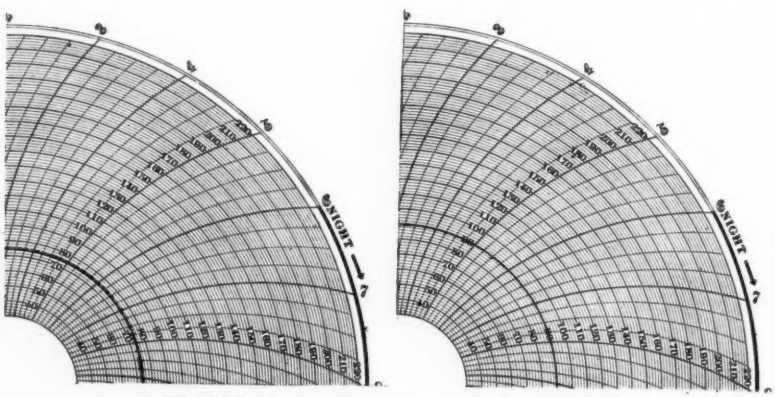


Figure 2
Wet- and Dry-bulb-temperature Recordings
Test condition 135° BP at 50 percent rh Research Fade-Ometer

Reproducibility for eight 18-hour exposures made on consecutive days of operation under one set of operating conditions is illustrated by Figure 4, in which the values for each 18-hour exposure of Light-sensitive paper 1554 is the average of six readings taken over the length of the exposed area.

In addition to the nine exposure conditions employed in the Research Fade-Ometer, complete sets of the dyeings were also exposed under two conditions in the Model FDA-R Fade-Ometer. In the first set, the FDA-R Fade-Ometer was operated under the conditions called for in AATCC Tentative Method 16-A-52, Colorfastness to Light, A, Carbon-Arc-Lamp Test. In this test the thermoregulator was set to produce an ambient air temperature of 105° F, which produced an average black-panel temperature of 195° F. In the second set of exposures in the FDA-R Fade-Ometer, the thermoregulator was turned down so that the blower was in operation continuously. Under the room conditions in which it was operated, this produced an average black-panel temperature of 170° F.

Two sets of daylight exposures were also made out of doors on the roof in a near loop location in Chicago, Illinois. These were made in the new Outdoor Exposure Cabinet, Model DE-1, as described by Seibert *(6)*. The first, or spring series, was started on February 4th, 1953 and was completed on May 31st, 1953. The second, or summer series, was started on July 21st, 1953 and was completed on August 24th. In the daylight tests, the samples were placed in the weather-proof exposure cabinets under glass. They remained out of doors continuously 24 hours a day and were brought in only for examination. The AATCC Tentative Test Method 16-B-52, Colorfastness to Light, B, Standard Sun Test calls for the samples to be exposed under glass only between the hours of 9:00 AM and 3:00 PM on sunny days between April 1st and October 1st. It was originally planned to include a sunlight test on these dyeings for comparison against daylight tests. However, the excellent lightfastness of some of the specimens and the small number of sunny days in the Chicago area at the time made it impossible to complete sunlight tests in time for inclusion in this paper.

In planning the project two procedures were considered. One consisted of varying the length of exposure time required for each dyeing to reach a definite color change under each of the exposure conditions. The other included the exposure of all samples of each dyeing for the same number of hours under the various exposure conditions and to report the variations in the amount of color change produced.

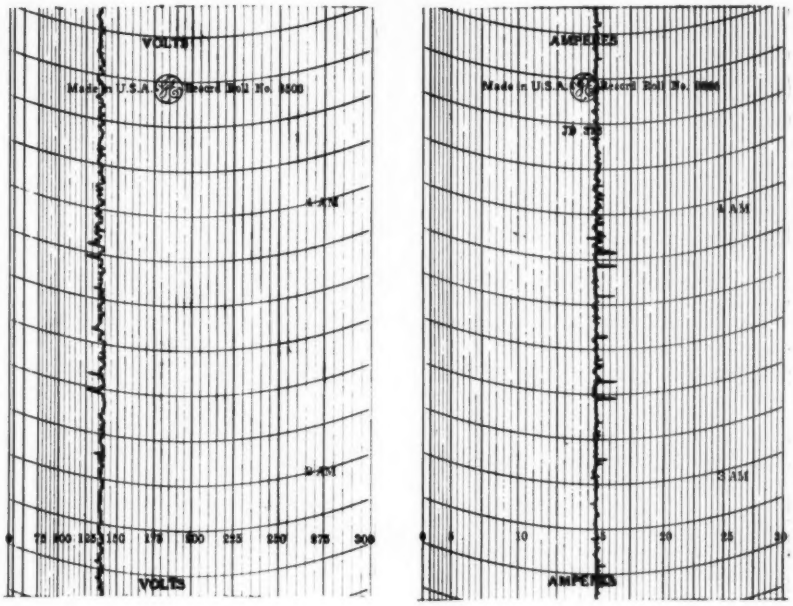


Figure 3
Arc-volt and arc-ampere recordings
Research Fade-Ometer

The first procedure was probably theoretically the most desirable. It would have permitted rating each sample against the AATCC and other Blue Wool Lightfastness Standards. It would also have eliminated any effects caused by the fact that most dyestuffs fade on a curve and not on a straight line when color change is plotted against increased time of exposure. However, with the hundreds of specimens involved, it would have been almost impossible in the machine exposures to insure that each sample would be removed from the test when it had reached a definite color change unless exposures were confined to the 8-hour working day. It was therefore decided, for the machine exposures, to adopt a definite number of hours of exposure for each dyeing for the eleven exposure conditions.

In determining the number of exposure hours for each dyeing, the Committee attempted to determine the number of hours under the least severe condition required to produce a just appreciable

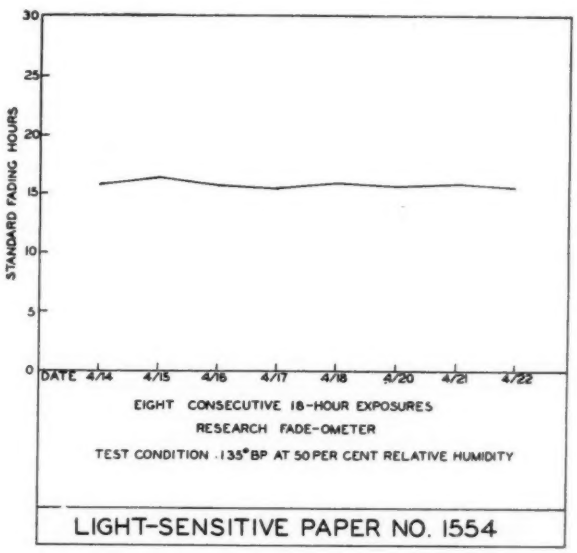


Figure 4

fade and which would not, under the most severe condition for the same number of hours, produce a complete destruction of the color. While all the exposures fall fairly well within this range, we now realize that we could have obtained a little better uniformity had we, at the time we chose the number of hours of exposure for each dyeing, had available the new proposed International Geometric Grey Scale.

For the undyed fibers one specimen of each fiber was exposed for the shortest number of hours and another for the longest number of hours to which any of the various dyeings on this fiber were exposed.

Both the intensity and number of hours of sunlight varied considerably from day to day. It was therefore not possible, in the two sets of outdoor daylight exposures, to utilize a uniform length of exposure for each dyeing as was done on the machine tests. In the daylight tests the dyeings were exposed until they showed a just appreciable color change, Grade 4 on the Proposed International Geometric Grey Scale, at which time they were compared against simultaneous exposures of the AATCC Blue Wool Standards and ratings assigned.

Evaluation of test results was made by visual grading against the Grey Scale. Each specimen was independently graded by three different members of the Committee, and results were averaged. The Grey Scale, now available from AATCC Headquarters at Lowell, consists of five pairs of gray areas, or paper chips. The first pair, Grade 5, shows no contrast, while the last pair, Grade 1, shows a considerable contrast with the spacings between them increasing geometrically. Based upon photometric measurements, there is a difference of 1½ NBS units of color difference between the pair in Grade 4, 3 NBS units between the pair in Grade 3, 6 NBS units between the pair in Grade 2 and 12 NBS units between the pair in Grade 1.

It should be realized that, while the contrast between the original and exposed area of a dyeing may be visually equal to the contrast between a pair of chips on the Grey Scale, the number of NBS units of color difference between the original and the exposed dyeing as determined by photometric measurement may be quite different from those of the Grey Scale. They will also vary from color to color. For example, AATCC Blue Wool Standard L-4, when exposed for 20 standard fading hours in the Master Lamp at the National Bureau of Standards, will show approximately 3 NBS units of color difference between the original and the exposed area. However, this will visually compare with the contrast of Grade 4 of the Grey Scale, which has 1½ NBS units of color difference.

For grading purposes the exposed dyeings and Grey Scale were placed on a medium-dark-grey cardboard background having a matt finish. The specimens were viewed by the examiner from an angle of 90° and with north sky light striking the specimens at an angle of approximately 45°; the examiner himself faced north.

In a preliminary check it was found that variations in the gradings assigned by the observers varied with the perpendicular distance at which they were viewed. We therefore adopted an arbitrary vertical viewing distance of 24 inches from the specimens, and all gradings reported were made at that distance.

Under the above conditions of viewing, the contrast between the exposed and unexposed portion of a specimen is compared with the contrasts of the five pairs of chips on the Grey Scale. The color-change rating assigned is then the number of the pair of chips on the Grey Scale whose contrast corresponds to the contrast between the original and exposed area. If the contrast lies between two of the steps on the Grey Scale, an intermediate rating is assigned.

TABLE I
RELATIVE SENSITIVITY OF COLOR ON DIFFERENT FIBERS TO HUMIDITY AND TEMPERATURE

	Humidity	*Temperature*
Acetate with acetate dyes	0.8	0.8
Dacron with acetate dyes	0.4	1.5
Dynel with acetate dyes	0.6	5.5
Nylon with acetate dyes	1.8	3.8
Orlon with acetate dyes	0.1	2.2
Wool with acid dyes	0.1	1.3
Acrilan with acid dyes	0.5	1.9
Nylon with acid dyes	1.5	4.5
Vicara with acid dyes	1.4	2.2

TABLE II
RELATIVE SENSITIVITIES OF VARIOUS DYESTUFFS

	Humidity	*Temperature*
Celliton Fast Blue FFRN	0.7	2.9
Nacelan Fast Yellow CG	0.6	1.8
Celliton Fast Pink RFG	0.9	3.5
Anthraquinone Blue SWF	1.6	2.9
Sulphon Yellow RS	0.5	1.8
Pontacyl Fast Red	0.5	2.3

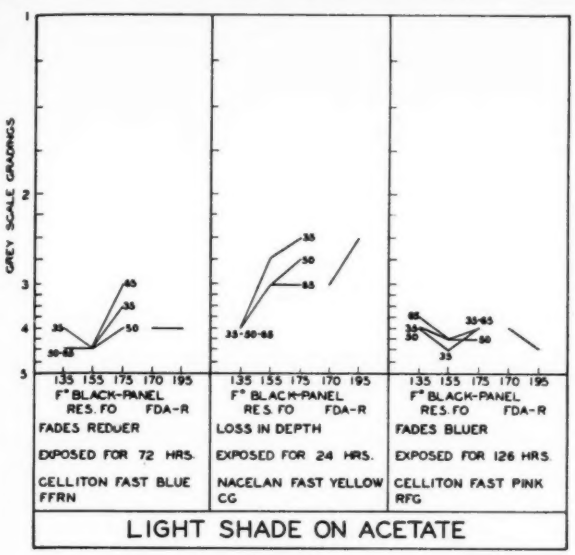
TABLE III
OUTDOOR EXPOSURES
Class Ratings Determined by AATCC Blue Wool Standards

	Blue		*Yellow*		*Red*	
	Spring	*Summer*	*Spring*	*Summer*	*Spring*	*Summer*
Acetate						
Light Shades	L5	L5	L5	L5	L6	L7
Dark Shades	L3	L/	L7	L7	L6	L7
Dacron						
Light Shades	L3	L2	L7	L5	L7	L8
Dark Shades	L2	L1	L8	L5	L7	L8
Dynel						
Light Shades	L4	L2	L4	L2	L6	L5
Dark Shades	L4	L2	L7	L6	L7	L5
Nylon						
Light Shades	L7	L5	L7	L7	L6	L4
Dark Shades	L7	L5	L7	L8	L7	L5
Orlon						
Light Shades	L4	L2	L5	L4	L2	L1
Dark Shades	L4	L2	L5	L7	L3	L1
Wool						
Light Shades	L4	L4	L3	L2	L2	L1
Dark Shades	L4	L5	L5	L5	L3	L2
Acrilan						
Light Shades	L5	L5	L1	L1	L1	L1
Dark Shades	L6	L5	L2	L1	L3	L1
Nylon						
Light Shades	L6	L5	L4	L4	L3	L2
Dark Shades	L7	L5	L5	L4	L4	L3
Vicara						
Light Shades	L6	L5	L3	L2	L1	L2
Dark Shades	L7	L5	L4	L4	L3	L4

DISCUSSION

Examination of the exposures in the ranges covered by this work indicated that, in general, increases in temperature had much more effect on both fibers and dyestuffs than did increases in relative humidity. Also, it was noted that there were much more definite patterns by fiber grouping than by dyestuff grouping.

The charts, Fig No. 5 through No. 22, were therefore made up to show relative amounts of color change against temperature curves at the various humidities by fiber grouping.



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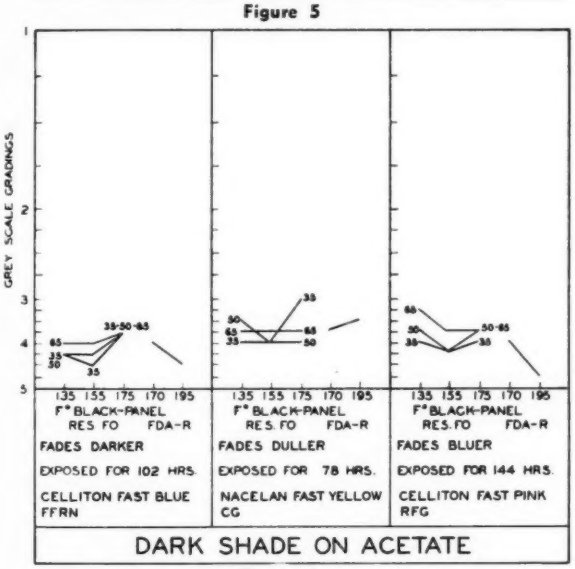

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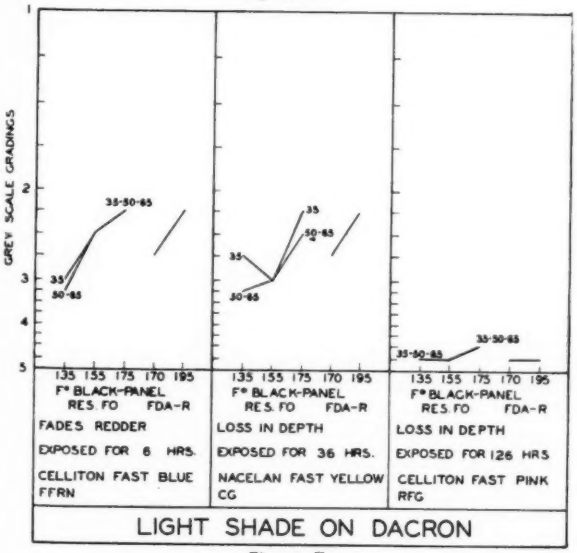

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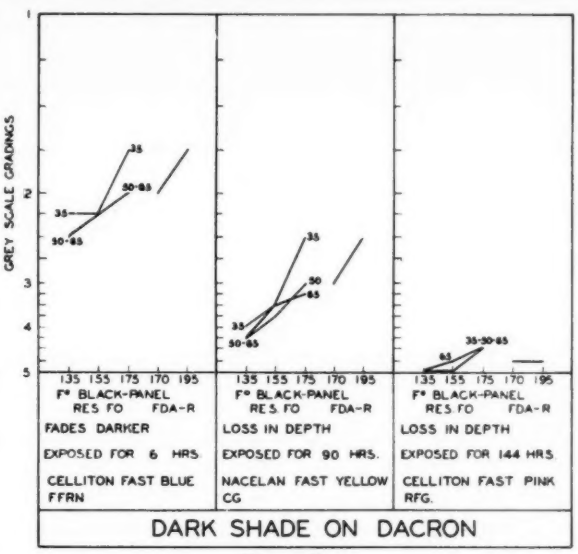

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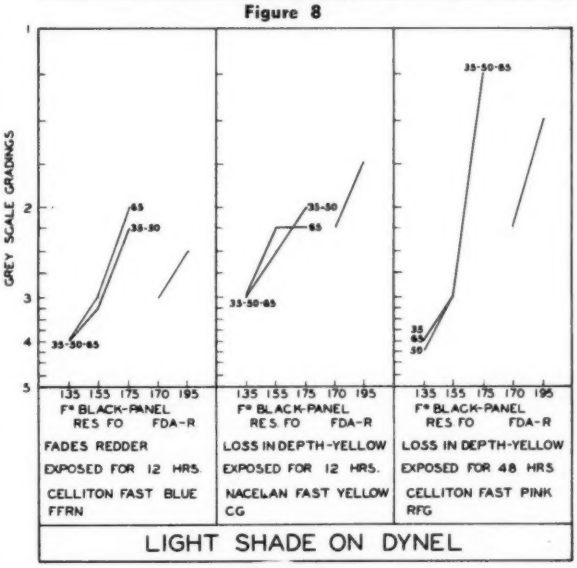

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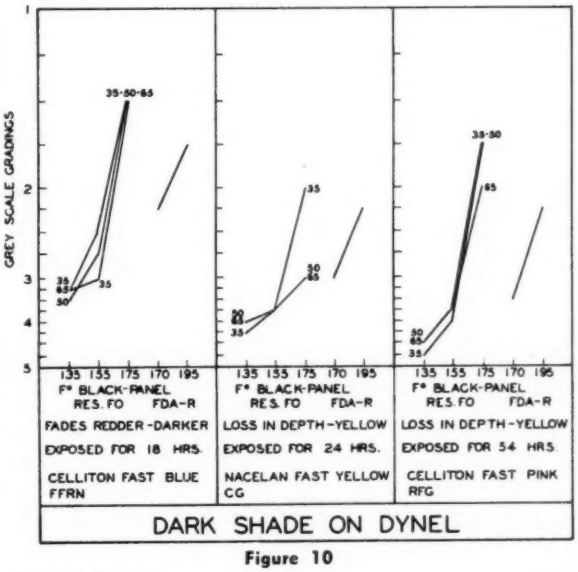

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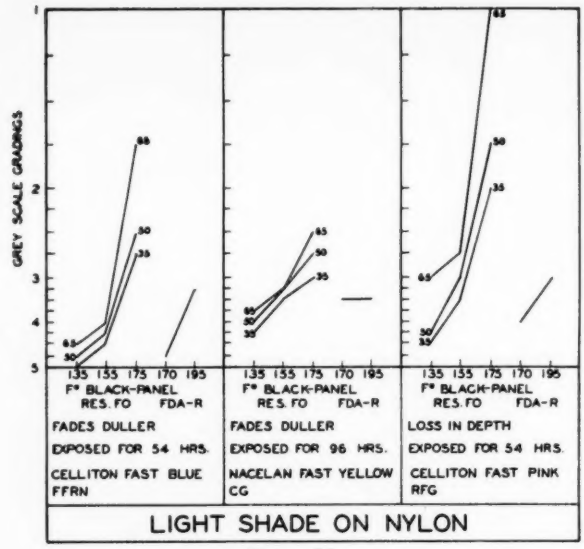

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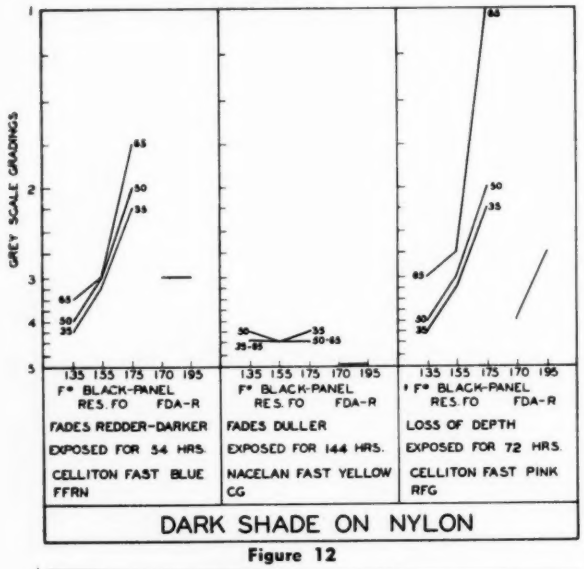

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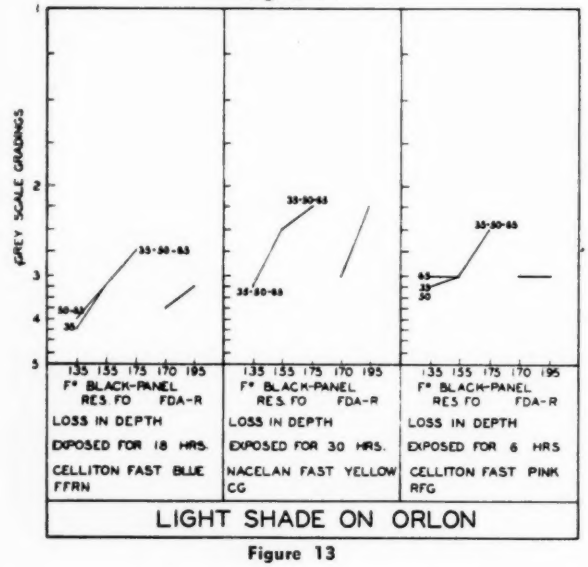

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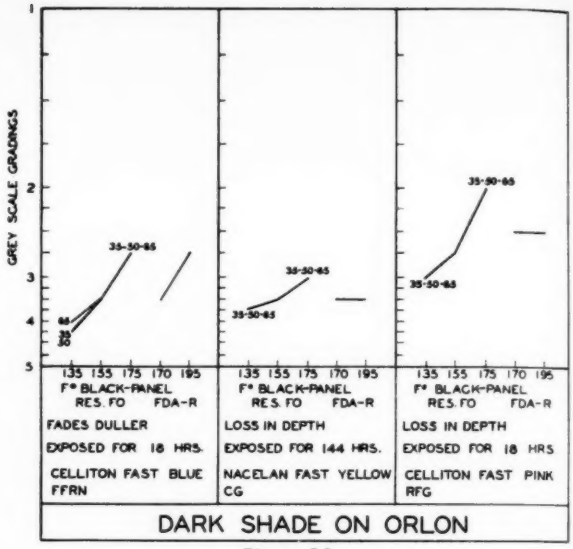

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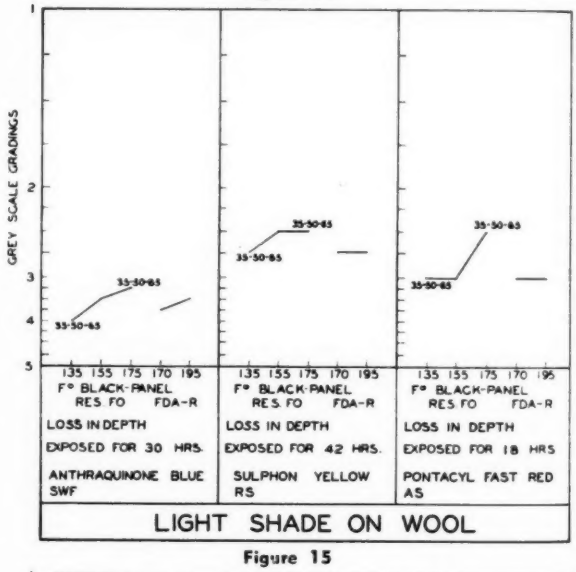

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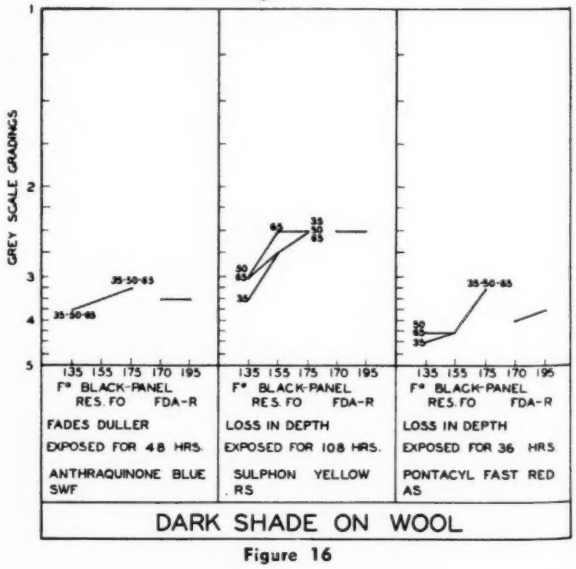

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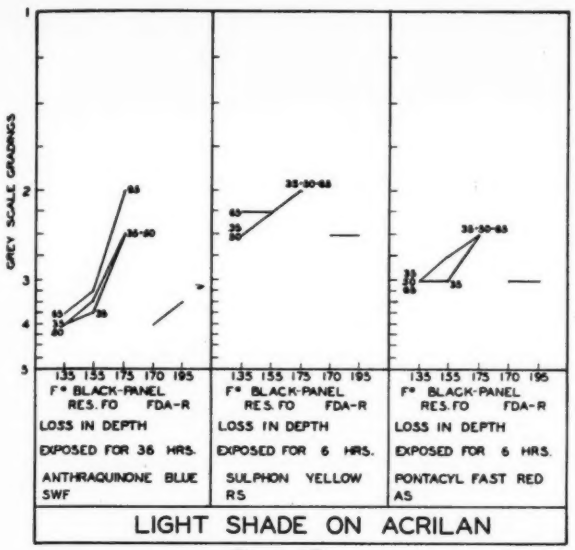

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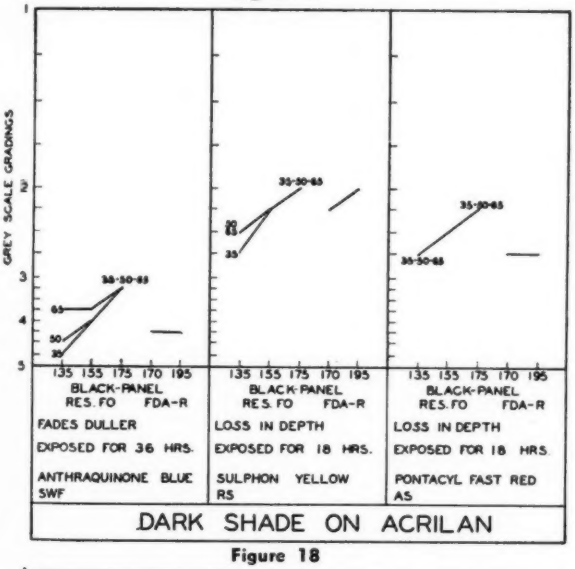

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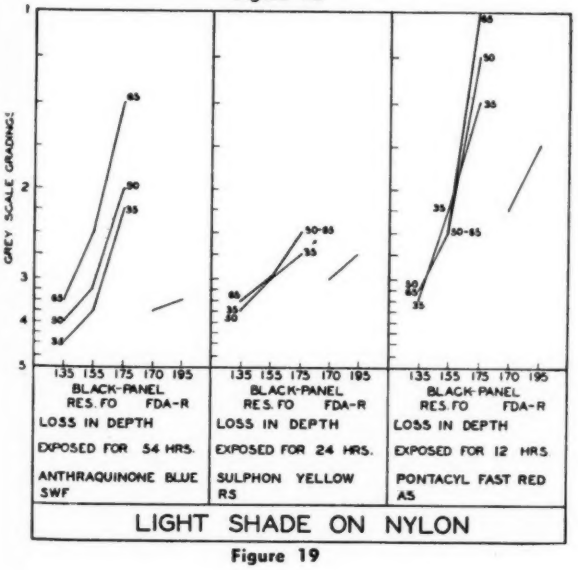

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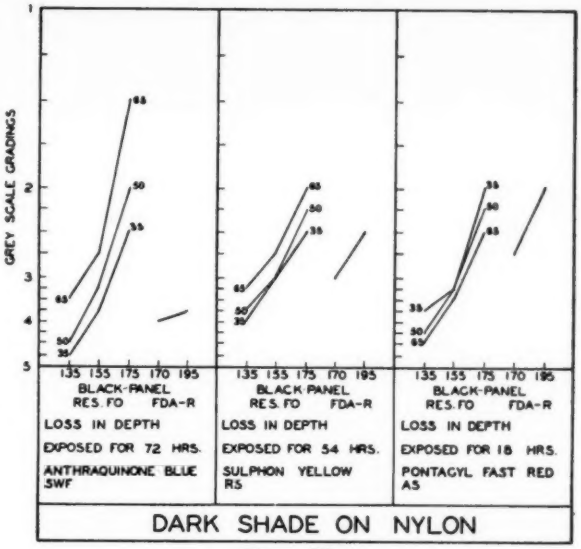

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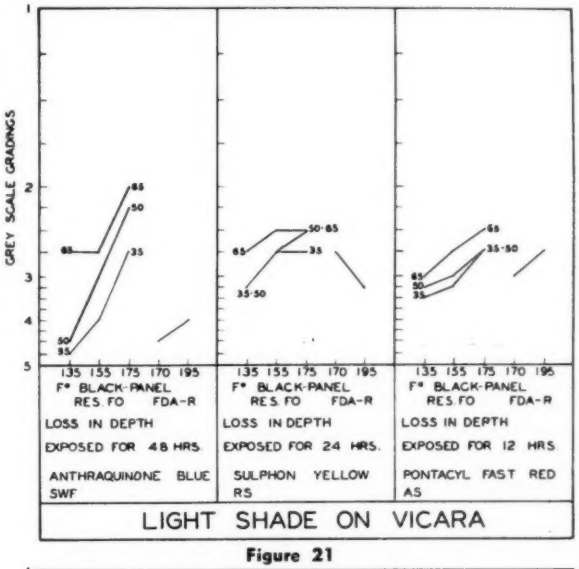

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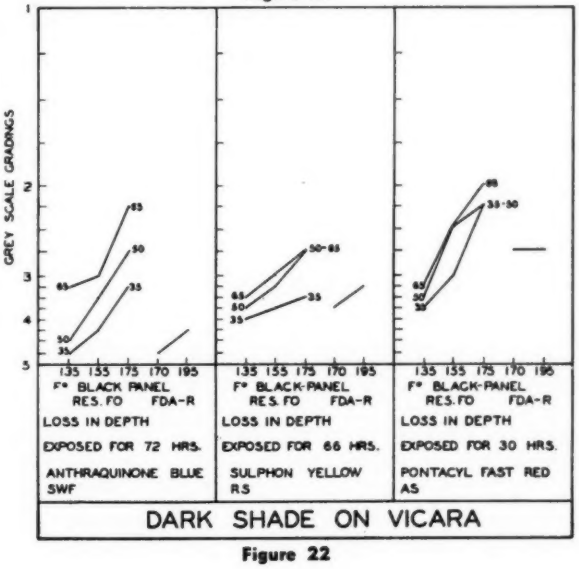

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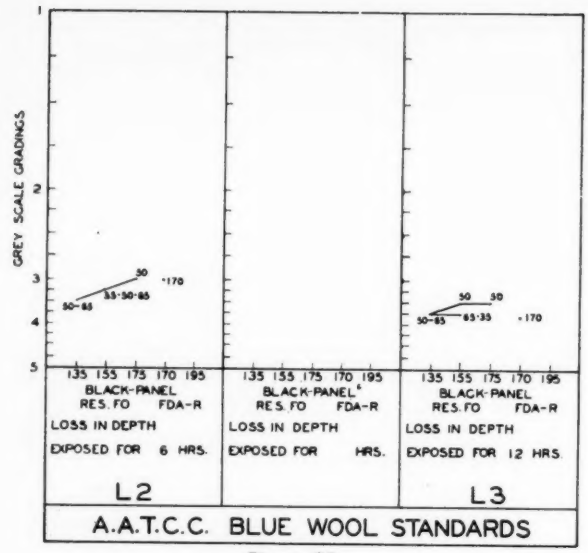

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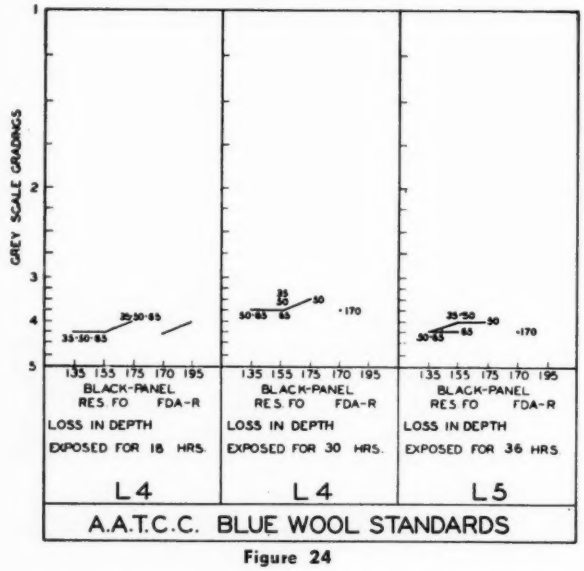

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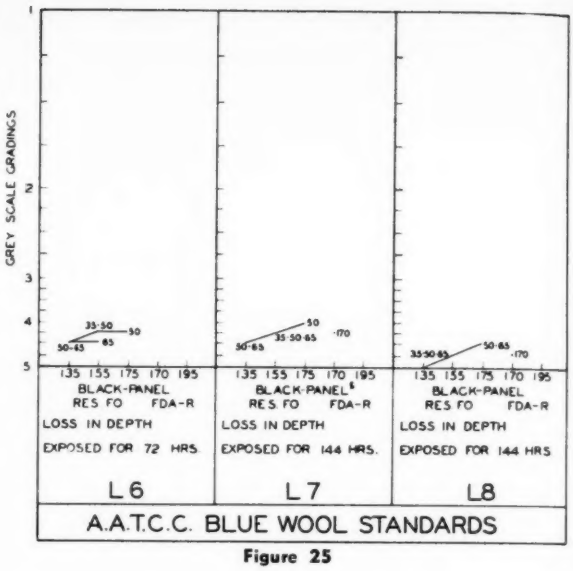

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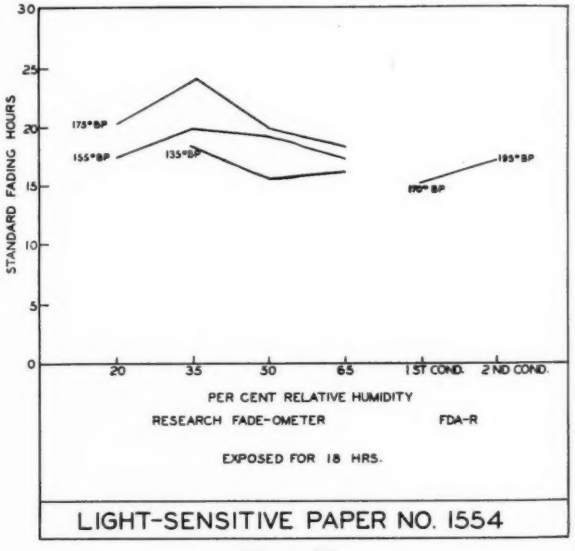


Figure 26

It should be understood that the numerical values for the points on the temperature curve represent only contrast values against the Grey Scale, which may be the result of either a decrease or increase in the depth of shade and/or a change in hue. The character of the color change is noted at the bottom of the chart for each dyeing. In the humidity and temperature ranges covered by this work, while the amount of color change varied considerably, the character of the change was the same for all of the exposures in each individual dyeing.

The charts, Fig No. 23 through No. 25, show the Grey-Scale gradings for the AATCC Blue Wool Standards L-2 through L-8. Our selection of the number of hours of exposure for each standard was based upon the fact that we obtained a just appreciable fade on L-4 in 18 hours of exposure at the lowest temperature and humidity condition. The selected exposure time was then doubled each time for the next higher-numbered standard. We also included an extra 30-hour exposure on standard L-4. Increases in temperature and humidity as well as doubling the exposure time failed to produce the anticipated increases in color change, so that only a very slight color change was produced on the higher-numbered standards.

Figure No. 26 gives the number of standard fading hours produced in an 18-hour exposure of Bureau of Standards Lightfastness Paper 1554. The values given for each exposure condition represent the average of eight consecutive exposures of 18 hours each.

Table III is a tabulation of the ratings for each of the dyeings against the AATCC Blue Wool Standards for both the spring and summer outdoor exposures.

To permit an analysis of the general effect of temperature and humidity on both the fibers and dyestuffs, we used an arbitrary linear scale, instead of the geometric scale, with numerical values to indicate relative amounts of color change. This permitted us to assign numerical values for each dyeing representing the total variation produced over the temperature range covered for each of the three relative humidities and the total variation produced over the humidity range covered for each of the three temperatures.

We then averaged the variations due to temperature and humidity for each dyeing, for each dyestuff in both depths of shade on each fiber, for all of the

dyeings on each fiber and for all of the fibers for each dyestuff. Based on the color change on all of the dyeings on each fiber, Table I represents the relative values of the sensitivity of the colors on each fiber to temperature and humidity.

Thus, in general, all of the fibers were affected much more by increases in temperature than they were by increases in relative humidity. Acetate, Dacron, Dynel, Orlon, wool and Acrilan are affected very little by variations in relative humidity. Nylon and Vicara are moderately affected by variations in relative humidity.

With increases in temperature some increases in color change occurs on acetate, Dacron and wool, moderate increases are noted on Orlon, Acrilan and Vicara and considerable increases on nylon and Dynel.

Based on the color change on all of the dyeings on the various fibers for each dyestuff, the average relative values in Table II indicate the sensitivity of the various dyestuffs to both humidity and temperature.

In general, dyestuffs, like fibers, are more affected by increases in temperature than increases in relative humidity. Both Nacelan Fast Yellow CG and Sulphon Yellow RS are least affected by both temperature and humidity. The Anthraquinone Blue SWF is affected the greatest by humidity changes and the Celliton Fast Pink RFG shows the greatest effect from temperature change.

No abnormal hue change or character of fade was observed between the spring and summer outdoor tests, and the various Fade-Ometer tests when the black-panel temperature did not exceed 175° F.

Since both the wool dyeings and the AATCC Blue Wool Light Fastness Standards show little if any effect from variations in relative humidity and moderate effect from changes in temperature up to 175° F, black-panel, it should be expected that other fibers and dyestuffs with widely varying sensitivities to temperature and humidity will receive different lightfastness ratings as the conditions of temperature and humidity are varied either in outdoor exposures or in the Fade-Ometer.

Calibration of the Fade-Ometer by Light-sensitive Paper 1554 is recommended with adjustment of the intensity of the radiation so that, at 175° F black-panel temperature, the Fade-Ometer does not produce in excess of 20 standard fading hours in 20 hours of operation. The black-panel thermometer is recommended for the measurement and control of temperature with a desirable maximum at 175° F. Careful attention to the cleanliness of the air filter and wicks is necessary for maintenance of the recommended maximum temperature.

ACKNOWLEDGMENT

The Committee wishes to express its gratitude for the assistance of Phoenix Dye Works, Inc, for producing the necessary dyeings, of Bear Brand Hosiery Co for the knitting of the samples, and of Atlas Electric Devices Co for the use of special research equipment necessary for conducting the tests. Especially grateful acknowledgement is tendered to J E Norton and R R Metzinger of Atlas Electric Devices Co for their valuable guidance and assistance in conducting the tests and evaluating the results.

REFERENCES

(1) T H Morton, "The Practical Assessment of the Light Fastness of Dyeings", Sept 1949 Symposium, Soc of Dyers and Colourists.

(2) P W Smith, "Observations on the Anomalous Light Fastness of Some Dyed Textiles", 1949 Symposium, Soc of Dyers and Colourists.

(3) W L Lead, "Artificial Light-fastness Tests on Colored Textiles", 1949 Symposium, Soc of Dyers and Colourists.

(4) T Vickerstaff and D Tough, "The Quantitative Measurement of Light Fastness", 1949 Symposium, Soc of Dyers and Colourists.

(5) Southeastern Section, AATCC, "A Study of the Effects of Fabric Construction and Mercerization on The Light and Wash Fastness of Vat Dyes", *Am Dyestuff Reptr* 41, 173 (1952).

(6) AATCC Res Subcommittee on Fastness to Light (Seibert) "A Study of Anomalous Fading in The Fade-Ometer", *ibid*, 42, 379 (1953).

(7) Boor & Trucker, "An Improved Fade-Ometer", *ASTM Bulletin*, April 1953.

Statistical Approach —

(Concluded from Page P493)

disputing any of those situations, but I am just trying to say that if you get down to fundamentals and get these facts, which are what statistics are, you have a chance of conducting your business as it should be.

In the matter of engraving and color costs I followed procedures which I will admit were rough, but it does not take long to make these charts (indicating on blackboard) and they will help a great deal.

* * *

Mr Jacoby illustrated and explained some examples on the blackboard using several charts and graphs. Charts drawn were for the following:

1) Gallons per 100 yards against depth of engraving for patterns 25-50-75-100% covered.
2) Color cost per yard against % coverage for print pastes at various costs per gallon.
3) Reduction or "light" against ounces of dye per gallon of print paste.
4) Cost per gallon against reduction for each dye used.

* * *

With those four charts you have the opportunity of visualizing every job. After all, if you are dealing with 25 and 35 percent of your operating cost, and on the other 75 or 65 percent you are powerless, it is worth spending a little effort on that portion.

I have been talking up to now about my experience as a plant manager, which terminated seventeen years ago when I started with Ciba Company, so I do not want to talk only about the past.

Tuesday of this week I went to see the president of one of the largest and most successful finishing plants in the United States. I said to him, "Next Friday night I am going to speak at our Western New England Section on the subject of statistics. What is your opinion of them?"

He said, "We could not operate without them. We use them in every phase of our business." He gave me many actual figures. He got out a sheet going back to January 1, 1944 and coming down to date. This was on runovers, returns, rehandles, or whatever you want to call them.

He said, "Look, back in 1944 — 2.9, 2.6, 2.7%. Everybody wrung his hands and said, 'Isn't that terrible,' because, after all, every yard of goods you rehandle is extra cost and you get no more money for it." He continued, "We broke that down and listed rehandled goods or runovers due to stains, due to off shade, due to clip outs, due to incorrect finish. We broke that down again and then we knew where to go to try and reduce these runovers." "And," he ended, "look at the figures here last year and the first two months this year: 1.2, 1.1, 1.3% compared with 2.8, 2.9, and 2.6% formerly."

Those are actual accomplishments. I mentioned my back-grey story, and he said they had done the same thing on end cloths. They were using a 60 x 48 sheeting for end cloth and putting four yards on a roll. They found after a few uses the end cloth had become so short it was no good, and also the 60 x 48 did not stand up very well, so they went up to five yards of 68 x 72. In other words, they were using cloth which was costing considerably more a yard and using five yards instead of four, and he said, "We saved hundreds of dollars a month on end cloths for the jig dyehouse."

He summarized by saying, "The money we spent to gather these statistics yields 1000% on what it costs us." That is an opinion obtained last Tuesday.

I want to say that I am indebetd to your Committee for giving me this subject and making me think about it. It made me realize how all my life I have been indebted to statistics but I will say this to you, I have been indebted to them only because they were my servant and not my master, and if you men make them your servant and do not let them master you, I am sure statistics will serve you just as well. Thank you.

ACTIVITIES OF THE LOCAL SECTIONS

Rhode Island

THE Rhode Island Section held its first Ladies' Night at the Sheraton Biltmore Hotel, Providence, R I, on May 7, 1954, with 220 members and guests attending.

"Nanci" Stuart conducted a "Glamour Clinic", and dancing to the music of Johnny Russell and his orchestra followed.

New York

MEETING dates for the New York Section for the '54-'55 "season" will be as follows: October 15, November 19 (Kohler's Swiss Chalet, Rochelle Park, N J); January 28 (Georgian Room, Hotel Statler, New York, N Y); February 25 (Skytop, Hotel Statler, New York, N Y); March 18, April 22, May 20 (Kohler's Swiss Chalet, Rochelle Park, N J).

Western New England

APPROXIMATELY 100 members and guests attended the 7th Annual Outing of the Western New England Section at the Chase Country Club, Waterbury, Conn, on June 18, 1954.

Prizes were awarded to winners of the golf, horseshoes, darts, and chess competitions. Doorprize winners were announced at the evening banquet.

(See outing photos on opposite page.)

Rhode Island Section Outing——June 11, 1954

Wannamoisett Country Club, Rumford, R I

(Photos by Jack Trezise and Ken Everett)

Western New England Section Outing——June 18, 1954

(Photos by A N Henschel)

Hudson-Mohawk

THE May 14th meeting of the Hudson-Mohawk Section was held at Schuyler Meadows Club, Loudonville, N Y. Speaker of the evening, Mrs Dorothy Liebes, discussed "Application of Color to Textile Design." Her talk was illustrated by colored slides and several exhibits of fabrics and finished consumer items. Over 115 members and guests were present.

Sectional officers for 1954-55 were elected as follows:

Chairman—Harvey Gendrau, Sandoz Chem Works Inc

Vice-Chairman—William A Nelson, Ritter Chem Co

Treasurer—John Merrill, Cluett Peabody & Co

Secretary—Leonard S Lang, Cluett Peabody & Co

Irwin J Smith, Surpass Chemical Co, past chairman of the Section, was presented with the Jack Epelberg Memorial Award, which was established to perpetuate the name of one of the cofounders of the Hudson-Mohawk Section and its first chairman.

At the conclusion of the business and technical sessions, an informal dance was held, with 68 attending.

* * * *

THE Sixth Annual Outing of the Hudson-Mohawk Section was held June 18, 1954, at the Totem Lodge Country Club at Burden Lake, N Y. One hundred members and friends of the Section participated in a variety of outdoor activities under perfect weather conditions.

Golf prizes were awarded to the following:

Low Gross:

1st ——— Harry Aylward ——— Surpass Chemical Co, Inc

2nd———Earl Palmatier———Bigelow-Sanford Carpet Co, Inc

3rd———Dick Ritter———Ritter Chemical Co, Inc

Low Net:

1st ——— Norton Pratt ——— American Aniline Products, Inc

2nd———Cass Thompson———Mohawk Carpet Mills, Inc

3rd———Norman Davis———Bigelow-Sanford Carpet Co, Inc

Nearest Pin:

1st———Lee Kinneman———Morwhite Chemical Co, Inc

2nd ——— William Nelson ——— Ritter Chemical Co, Inc

Longest Drive:

1st———Norm Logenby

2nd ——— Don Reisige ——— Mohawk Carpet Mills, Inc

3rd———G Allen

Putting:

1st ——— Irving Feyler ——— General Aniline & Film Corp

2nd ——— E Allard ——— Cluett, Peabody & Co, Inc

3rd———Bill Szabo

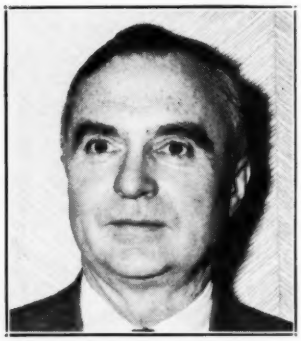
1954 National Convention and "The South's First Textile Wet Processing Exhibit"——

SPONSORED BY THE SOUTHERN REGION ★ THE ATLANTA BILTMORE ★ ATLANTA, GEORGIA ★ SEPTEMBER 15, 16, 17, 18

58 CONCERNS TO EXHIBIT AT ATLANTA CONVENTION

NEARLY sixty displays will make up the South's first textile wet processing exhibit at Atlanta next month in conjunction with the 33rd National Convention in Atlanta. The exhibits are expected to cover a wide range, including dyestuffs, textile chemicals, dyeing and finishing machinery and instrumentation.

The current list of exhibitors scheduled to display at Atlanta follows. A more comprehensive list, including company addresses, booth locations, exhibit descriptions, and personnel who will be in attendance, will appear in the August 30th (Convention) issue.



John C Cook,
Chairman, Exhibits Committee

LIST OF EXHIBITORS

Allied Chemical & Dye Corp (National Aniline Div)
American Aniline Products, Inc
American Bemberg Co
American Cyanamid Co (Organic Chemicals Div)
American Dyestuff Reporter
America's Textile Reporter
Arnold, Hoffman & Co, Inc
Atlas Electric Devices Co
Chemicolloid Laboratories
Chemstrand Corp
Ciba Co, Inc
Clark Publishing Co
Custom Scientific Instruments
Daily News Record
Dow-Corning Corp
E I duPont de Nemours & Co, Inc
Eastman Chemical Products, Inc
Gaston County Dyeing Machine Co
General Dyestuff Company
B F Goodrich Chemical Co
Goodyear Tire & Rubber Co
E F Houghton & Co
Instron Engineering Co
Interchemical Corp (Textile Colors Div)
International Salt Co
Kelco Co
Mathieson Chemical Corp
Metro-Atlantic, Inc
Modern Textiles
Morton Salt Co
Nopco Chemical Co
Nova Chemical Corp
Pittsburgh Coke & Chemical Co
Rohm & Haas Co
F H Ross & Co
Royce Chemical Co
Sandoz Chemical Works, Inc
Scholler Bros, Inc
Seydel-Woolley & Co
Smith, Drum & Co
Southern Dyestuff Corp
Standard Chemical Products, Inc
Sterling Drug (Hilton-Davis Chemical Co Div)
Tennessee Corp
Textile Age
Textile Industries
Textile World
Union Carbide & Carbon Corp (Carbide & Carbon Chemicals Co Div)
United States Testing Co
Versenes Inc
Virginia Carolina Chemical Corp
Virginia Smelting Co
John Waldron Machine Co
Edwin L Wiegand Co
Wallerstein Co, Inc
Jacques Wolf & Co
Wica Chemicals, Inc

INDEX TO PATENT DIGEST

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● ABSTRACTS ●

The Effect on Wool of Boiling in Aqueous Solutions: I———Solutions at pH 1.5-9 with and without Sodium Sulfate

R V Peryman, *J Soc Dyers Colourists* 70, 83-92, February, 1954.

Wool of 64s quality, in the form of yarn and cloth, has been given boiling treatments of 3 hours with 50 minutes for raising to the boil to imitate prolonged commercial dyeing processes but without the addition of dye. The pH of the solutions has been controlled at selected pH values between 1.5 and 9 by the gradual addition of sulfuric acid or sodium carbonate during the boiling. The wool has subsequently been examined for modification by means of determinations of alkali solubility, soluble nitrogen, disulfide sulfur, total sulfur, breaking load air-dry and wetted with water, extension at break, abrasion resistance, and loss in weight.

The conclusions reached are: (1) the wools have suffered minimum modification when boiled at pH 3-3.5; (2) sodium sulfate, in concentrations up to 9.2 gpl, has shown relatively little effect on the wool within the pH range 1.7-6.8, but above pH 6.8 the presence of sodium sulfate has caused alkali damage, which increases rapidly with increase of salt concentration and rise of pH; (3) a strong correlation has been found between disulfide content and wet breaking load for treatments having pH values above 4; a similar correlation has been found to apply to abrasion resistance after about 20 percent of the original disulfide sulfur has been broken down; (4) alkali solubility and soluble nitrogen have shown a strong correlation with abrasion resistance, and to a lesser extent with wet strength for treatments having pH values below 2.5.

The practical implications of these results are discussed by the author. It is not suggested that wool dyed at the same pH value and for the same time will undergo changes in properties identical to those produced in one of the present experiments. Allowance would have to be made for the modifying effects of dye, lake, and mordant on the physical properties of wool, but it seems neither likely that these effects would be large in pale shades nor probable that the breakage of peptide and disulfide bonds would be entirely prevented by these agents. The presence, however, of tervalent chromium within the fiber in excess of the amount required for lake fomation would, by the production of new cross-linkages, be expected to have a strengthening effect.

The author cites 42 references to the literature.—WHC

Rags and Shoddy

J Hepworth, *J Textile Inst* 45, P62-3, February, 1954.

The rag and shoddy industry is essentially a waste industry. Its raw material is cast-off garments and waste fabrics from a large variety of industries. In the shoddy trade nothing is wasted from old rags except the buttons. The trade is entirely dependent upon the waste of others, and it is surprising with what regularity in color, quality and quantity this waste enters the trade channels. Because of this constancy in supply, rags can be sorted into standard grades, most of which have been made regularly for the past fifty years.

Shoddy and mungo account for 25 percent of the material used in the woolen spinning industry. There are certain overcoatings, meltons and blazer cloths which could not be made without mungo, whose short fine fiber helps to give both firmness and hardness to the cloth.

In addition to the supply of old clothing which the ragman collects, there are waste fabrics from industry, roller cloths from the cotton spinning mills, tailors' cuttings, printers' blankets, and a great variety of other materials. The quantity of cotton rags is the greater, but the wool rags are the more valuable. In addition to the domestic supply, rags are imported from many other countries, including such places as Turkey and North Africa.

Woolen manufacturers choose a rag which will impart to the cloth or yarn those characteristics for which the original wool was chosen; e g, men's blue worsteds are used for making suitings. Usually rags from men's wear can be used as self shades in certain cloths, e g, khaki and RAF uniforms, or, if they are to be stripped of color and redyed, they can be used only for duller and darker shades. Rags from ladies' wear, on the other hand, are more easily stripped and can be dyed to brighter shades either in the rag or in piece form.

The rag trade is very concerned about the growing use of synthetic fibers, both as a competitor to wool and also because the fibers are present in rags. This presence of synthetic fibers in the rags is felt particularly if they do not carbonize out. Rags containing 50 percent synthetic fibers and 50 percent wool can be recognized, but rags containing small quantities of the synthetics are more difficult to identify.

Without this intricate rag and shoddy trade there would be many people all over the world without sufficient clothing, because insufficient wool is grown.—WHC

The Dyeing of Acetate Rayon With Disperse Dyes: I———Aqueous Solubility and the Influence of Dispersing Agents; II———The Relation Between Aqueous Solubility and Dyeing Properties

C L Bird, *J Soc Dyers Colourists* 70, 68-77, February, 1954.

The most important coloring matters for cellulose acetate rayon are the disperse dyes, which consist mainly of azo and anthraquinonoid compounds. Although a few of these dyes show slight solubility at dyeing temperatures (75-85° C) they cannot be applied from aqueous solution in the usual way. Instead, they are used in the form of very fine dispersions with a particle size of about 2μ. Disperse dyes are usually sold as powders, which are prepared by milling the press cake with an equal weight of a suitable auxiliary product and a little water, drying, and then mixing with a diluent, e g, Glauber's salt, to give a product containing 15-40 percent of actual dye. The auxiliary product used to facilitate grinding may consist of the sodium salt of a cresol-naphthalene-sulfonic acid-formaldehyde condensate, together with a little sodium alkylnaphthalene sulfonate.

None of the usual electrolytes is included in the dyebath during application of disperse dyes, but a dispersing agent (1-2 gpl) is almost always added. The dispersing agents commonly used comprise soap, Turkey Red oil, synthetic detergents of the alkyl sulfate or alkaryl-sulfonate type, and fatty alcohol-ethylene oxide condensates. One aim of the work described in this paper was to discover which products are the most efficient, besides determining the nature of their dispersing action.

It was clear at the outset that the dispersing action of these compounds was bound up with their ability to solubilize water-insoluble dyes. The author refers to a report by the Mid-West Section of the AATCC that was published in 1949, in which it was stated that considerable solubilization of three purified disperse

dyes that were tested took place in 1 percent solutions of various dispersing agents at 25° C.

The author presents a table of 43 disperse dyes, each accompanied by its chemical constitution, with data on their aqueous solubility at 25° and 80° C, and their solubility in 1% Lissapol LS (sodium oleyl-p-anisidine sulfonate) at 25° C. In another table he lists the solubilities of several purified disperse dyes in water and in solutions of various dispersing agents at 80° C. Still another table shows the relation between the aqueous solubility of 17 dyestuffs and a) rate of dyeing and b) leveling power on acetate and nylon.

It is shown that aqueous solubility has some bearing on the rate of dyeing of disperse dyes and largely governs their leveling power. Addition of a dispersing agent to an acetate rayon dyebath reduces the percentage exhaustion to an extent which is proportional to the degree of solubilization.—WHC

The Refractive Indices of Textile Fibers

W R Moore, *Textile Recorder* 72, 81-4, May, 1954.

Although light radiations of wave lengths greater or less than those of the visible spectrum are frequently used for the study of textile fibers, there are a number of methods employing visible light. Most of these depend on the refraction of light by the fibers, such refraction being measured by the refractive index, defined as the ratio of the velocity of light in air to that in the fiber. Refractive indices vary both with temperature and the wave length of the light used, but are usually quoted for a particular temperature and wave length, often 20° C and the sodium *D* line. They also vary from one kind of fiber to another, and this variation can be used in studies of fiber structure and in the identification of fibers.

If a fiber is immersed in a liquid of refractive index different from that of the fiber and then examined microscopically, the fiber will be clearly seen, contrast depending largely on the difference between the refractive indices. Alternatively, if the fiber is immersed in a liquid of the same refractive index as itself, it will appear to be transparent and nearly invisible. Such differences in appearance can be used as an aid to fiber identification. Thus, wool, which has a refractive index of 1.550, is almost invisible when viewed in o-dichlorobenzene, which has the same refractive index. Similarly, viscose rayon is almost invisible in ethyl salicylate (1.527), silk in bromobenzene (1.560), and acetate rayon in limonene (1.473).

Fibers are built of long-chain molecules which can be arranged in two limiting ways — in regular orderly bundles called crystallites, or much more randomly in what are termed amorphous regions. The crystallinity, or percentage of fiber substance consisting of crystallites, is an important property of fibers. Crystallinity and refractive index are related. Other things being equal, the greater the refractive index the greater the crystallinity.

A table of the refractive indices of 14 textile fibers is included, and several methods for determining these values are described.

Because of the general structural pattern common to fibers, with long chains lying generally in the direction of the fiber axis, fibers are anisotropic, certain of their properties varying with the direction in which they are measured. Refractive index is such a property, and the value obtained with light vibrating parallel to the fiber axis and traveling diametrically differs from that measured with light vibrating perpendicular to the axis and traveling diametrically. The difference between these values is called the birefringence or double refraction of the fiber.

Ordinary light cannot be used to determine these refractive indices, since a beam of light contains vibrations in all planes perpendicular to the line of travel. It is necessary to use light vibrating in one plane only, viz, light which has been polarized by passing it through a piece of polaroid or a Nicol prism.

Several methods of using polarized light to determine birefringence are described. The author points out that this property of fibers is of a rather complex nature, being affected, for example, by the structure of the crystallites, by the fact that they are embedded in a medium of different refractive index (the amorphous regions), and by the extent of stretching of the fiber.

Microscopical examination using polarized light may be used in fiber identification. Birefringence measurements are of value, particularly on rayons and the synthetics. A table of these values for 14 different fibers is included.—WHC

Direct Dyestuffs

J H Anderson, *Textile J Australia* 28, 1520-2, February, 1954.

As is well known, azo dyes derived from benzidine have affinity for cotton. The author offers the following explanation of this affinity.

A characteristic of the benzidine dyes is that their molecules are long and narrow. As the cellulose of which cotton is composed exists as extremly long molecules, it appears that one of the first requirements of a direct dye is that it should be capable of aligning parallel to the cellulose chains. It has been shown from experiments with polarized light that in dyed cellulose the dye molecules are indeed so aligned.

A simplified picture of direct dyeing is that the dye molecules diffuse through the swollen areas of the cotton fiber, and become held, by hydrogen bonding, to the hydroxyl groups of the cellulose.

There is, however, one difficulty. All direct dyes contain sulfonic solubilizing groups, SO_3Na, and in solution, the dye will ionize and acquire a negative charge. Since the cotton fiber in water also has a negative charge, the like charges set up a repulsive force which may prevent entirely the dye anions from approaching the fiber. However, addition of an electrolyte, such as common salt, greatly reduces this repulsion and increases dyebath exhaustion. Polysulfonated dyes require more electrolyte than mono- or disulfonated dyes.

The exhaustion of a direct dye on cotton is rapid at first, and gradually becomes slower until equilibrium with the fiber is reached. The rate of exhaustion varies with different dyes.

The effect of increasing the temperature of the dyebath is to increase the rate of migration and so promote leveling. However, increasing temperature does not always increase dyebath exhaustion, and different direct dyes show a wide range of optimum dyeing temperatures at which maximum exhaustion is obtained during normal dyeing time.

Although direct dyes do show this great variation in optimum dyeing temperature, it appears that dyeing is best carried out at as high a temperature as possible, taking advantage of the increased leveling and migration at the higher temperature. Finishing the dyeing in a cooling bath would allow an increased exhaustion to be obtained as the bath cools. This latter expedient is frequently used in the dyeing of wool/cotton unions, whereby use of a cooling bath allows the dye to build up on the cotton.

The author refers to a report made by a committee of the Society of Dyers and Colourists in 1946, in which a test method was suggested by which direct dyes could be divided into the following three classes:

(a) Those of good leveling properties.

(b) Those of poor leveling power, but controllable by regulated salt additions.

(c) Those of poor leveling power which require additional temperature manipulation.

This classification has now been widely adopted.

Nine references to the literature are cited.—WHC

• Alliance and Blackman-Uhler Merge

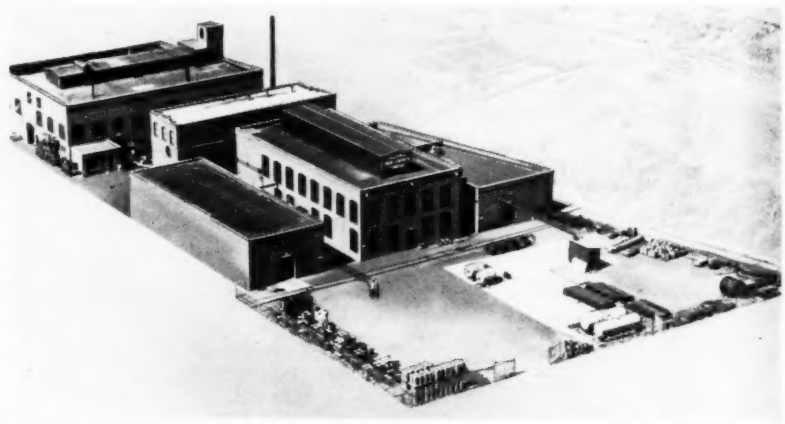
Harold W Coward, president of Alliance Color & Chemical Co, Newark, N J, and P C Blackman, Jr, president of Blackman-Uhler Co, Spartanburg, S C, have announced the merger of their firms. In this consolidation are included two affiliated companies, Blackman-Uhler Manufacturing Co and Alliance Chemical Corporation. The four companies will operate as divisions of the newly-formed Andover Co, under their own names and in their respective fields.

The Andover Co is not an operating company, but all of its officers and directors are also the chief executives of the four operating divisions.

The officers of The Andover Co are:
President—Harold W Rose
Vice President—P C Blackman, Jr
Vice President—Harold W Coward
Vice President—William B Uhler
Treasurer—Charles Ratterree, Jr
Secretary—Edmund R Roper

Alliance Color & Chemical Co, from its inception, has specialized exclusively in the manufacture of fast colors. According to Mr Coward, this specialization has produced one of the most comprehensive ranges offered to the trade. Blackman-Uhler Co has specialized concurrently in the distribution and servicing of fast colors, growing into one of the South's largest independent distributors of these products. The concentration by these companies in complementary phases of the fast-color field logically suggested a merger of their interests.

Alliance Color & Chemical Co began operations in 1946. Steady expansion has led to its present multiunit plant where, with equipment of advanced design, the company now produces most of the basic intermediates required in the manufacture of fast colors. Mr Coward was for 18 years a research chemist at National Aniline Division, Allied Chemical & Dye Corp, and Interchemical Corporation, and as president of Alliance, is in charge of manufacturing for all divisions.



The Alliance multiunit plant, which specializes exclusively in the manufacture of fast colors.

New Blackman-Uhler laboratories on the site purchased for the erection of additional manufacturing facilities in Spartanburg, S C.

The sales organization of Blackman-Uhler Co, which calls directly on dyers and printers, is actively headed by Mr Blackman, who for 16 years prior to the formation of his present firm, was chief colorist at Rock Hill Printing and Finishing Co.

Additional members of the Blackman-Uhler sales staff are: Edmund R Roper, secretary of the company, until 1950 employed by Pacific Mills, Lyman, S C; Charles Ratterree, Jr, treasurer of the company, employed for a number of years as a technical sales representative of National Aniline Division; Howell N McGuire, who began his career in the B-U laboratories in 1949, and after serving in the Army, rejoined the company in 1953 in a sales and technical capacity; and Joe W Gaffney, who until recently was chief colorist at Riegel Textile Corp, Trion Div, and formerly with Werthan Bag, Rock Hill Printing and Finishing Company, and American Finishing Company. Mr Gaffney has been associated with textile dyeing and printing for over 20 years.

Blackman-Uhler Manufacturing Co primarily produces fugitive tints for the identification of synthetic fibers. Its president, William B Uhler, spent nearly 25 years in the field with the Borne-Scrymser Co before forming this company. John Fergu-

Alliance standardization and application laboratory.

Blackman-Uhler application laboratory for testing and servicing fast colors.

son, formerly employed by Borne-Scrymser, and Mr McGuire assist Mr Uhler in technical servicing.

Alliance Chemical Corporation, with Harold W Rose as president, will continue to concentrate on the sale of the products of the manufacturing divisions to other chemical manufacturers and dyestuff distributors. Mr Rose has been in the chemical industry for 25 years, during which he was sales manager of Warwick Chemical Co and later, vice-president of Phoenix Color & Chemical Co.

The group has bought a large tract of land in Spartanburg, S C, for the immediate erection of new manufacturing and laboratory facilities, primarily for new products. Irwin Thornton, former chemist at Fairforest Finishing Co, will be in charge of the new plant. Mr Thornton is at present in charge of the B-U laboratories and will be replaced by Donald M Belser, also a former chemist at Fairforest Finishing Co.

The following additions to the staffs of the companies were announced as part of the new expansion:

Richard Cake will join Alliance as assistant to the president on August 16th. Mr Cake was, until recently, head of the pilot plant of Heyden Chemical Co where he had been employed for 11 years.

William Hoffman has joined Alliance as head of the Application Laboratory. He was for several years a chemist at United Piece Dye Works, Lodi, N J.

W E Eskew has been retained by Blackman-Uhler as a dyeing consultant.

In reviewing the consolidation, Mr Rose stated, "We are very proud of our new organization which, we believe, is comprised of some of the best technical men in the industry. The unification has greatly strengthened all the divisions, augmenting their ability to serve the trade, and, I am confident, will result in many worthwhile developments for the industry."

• PVP Prices Lowered by GAF

The prices of all the grades of polyvinylpyrrolidone (PVP) have again been sharply lowered by General Aniline & Film Corporation. The nonpharmaceutical grade has been reduced to $2.00 a pound in 1,000 pound lots from a previous price of $2.75 a pound.

PVP is one of the materials which will be manufactured at GAF's new Calvert City, Kentucky, plant for high-pressure acetylene derivatives, and greater volumes of this material will therefore be available by the end of 1955.

PVP is now available in commercial quantities from GAF's Linden, N J, plant. Samples and technical information can be obtained from Commercial Development Department, General Aniline & Film Corporation, 435 Hudson Street, New York 14, N Y.

Nopco Textile Division Executives
***Seated (l to r):* Ralph Schaubhut, E A Robinson, James Cairns.**
***Standing (l to r):* Neil Elphick, Melville Blackwood.**

• Nopco Enters Dyeing and Finishing Chemicals Field

Nopco Chemical Co, Harrison, N J, a leader for many years in the field of synthetic oils for use in fiber and yarn processing, has introduced a complete line of textile chemical specialties for the dyeing and finishing of textile piece goods. This development, which follows their entry into the warp-sizing specialties field several months ago, now allows Nopco to service the entire industry from fiber to fabric.

Simultaneous with the introduction of the new line, E A Robinson, Nopco vice president, announced a reorganization of his textile division. The new setup consists of four service departments: Spinning Oils and Lubricants, headed by Ralph Schaubhut; Warp Sizing Specialties, headed by Neil Elphick; Scouring and Dyeing Assistants, headed by James Cairns; and Fabric Finishes, headed by Melville Blackwood.

• PTI Scholarship Winners

Five winners of four-year, full tuition regional scholarships worth $1,800 each at the Philadelphia Textile Institute have been announced by Donald B Partridge, dean of students.

The scholarships, which were awarded on the basis of scholastic achievement and competitive examinations, were awarded to Donald R Stogo and Sandra Friedman of Philadelphia; Charles Baker of Ellicott City, Md; and Stanley Cear and Severio Russo of Brooklyn, N Y.

• Avisco Scholarship to Ga Tech

The Georgia Institute of Technology, Atlanta, Ga, has been awarded a $500 scholarship in textiles by the American Viscose Corporation.

Effective for 1954-55, the award will be given to a junior or senior textile student, who will be selected by the college at a later date.

• 4th TTFC Seminar

An attendance of several hundred is anticipated for the 4th biennial seminar of The Textile Technical Federation of Canada, which will be held Sept 9-11 at Queen's University, Kingston, Ont.

Keynote speaker for the event will be Walter J Hamburger, Fabric Research Laboratories, Boston, on the subject "Some Aspects of the Engineering Design of Fabric Structure."

Sessions will be held morning and afternoon on the following topics: Mill Management, Man-Made Fibers, Woolens & Worsteds, Cotton Manufacturing, Canadian Research, Dyeing & Finishing, Mill Engineering, and Knitting.

F B Wallace, H Parkinson, will head the Dyeing & Finishing Session, which will feature the following papers:

"Control of Fabric Degradation in the Application of Thermosetting Resins"— H C Borghetty, Rohm & Haas Co

"New Developments in Pigment Printing on Textile Fibers and Novelty Screen Effects"— F G LaPiana, Stein, Hall & Co Inc

"Principles of Textile Color Control"— Roland E Derby, Jr, The Derby Co, Inc

"Scouring Raw Wool with Nonionic Detergents and Salt" — H Zimmerman, Hart Products of Canada

"Research to Transform Cotton through Chemistry into New Textile Products"— C H Fisher, Southern Regional Research Laboratory, USDA.

"The Dyeing of Wool and Wool-Synthetic Blends"—Henry D Grimes, American Woolen Co

"Cotton Bleaching"—Oliver S Plantinga, Johnson & Johnson, and S A Simon, Chicopee Mfg Corp

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Additional information on the Seminar may be obtained from the Executive Secretary, The Textile Technical Federation of Canada, 1410 Guy St, Montreal, Quebec.

Those attending Heyden Chemical Corporation's Annual Sales Conference from June 16 to June 18 at the company's New York office included:

Seated (l to r): **F A Degener, chemical sales manager; Herman Sokol, vice president—research; Arthur Broadman, vice president—engineering and purchasing; John P Remensnyder, chairman of the board; Simon Askin, president; K M Irey, assistant vice president—production; F T Peters, manager—market development; C J Meisinger, general traffic manager.**

Standing (l to r): **S Neader, sales representative—Chicago; E Vogel, sales representative—Chicago; R Kulow, sales representative—New York; J T Kratina, sales representative—New York; Harold Von Oehsen, branch sales manager—New York; G Lee, vice president, McArther Chemicals, Ltd; E Barkley, technical sales representative; T Risch, branch sales manager—Cincinnati; I Loxley, branch sales manager—Providence; A G Stern, branch sales manager—San Francisco; W Spreen, Mid-West district manager; R Aude, plant manager—Fords, N J; T R Aalto, manager—technical sales; R Knowles, sales representative—Detroit; J Claypoole, branch sales manager—Philadelphia; W Kraft, group leader—Applications Group; J Hutchins, technical sales representative; Ely Balgley, supervisor, new product development; W Deakyne, sales representative, Philadelphia; J Doroskin, branch sales manager—Chicago.**

• Hilton-Davis Opens New Textile Center in Greenville

A new 7000-square-foot service laboratory and distribution center to serve the textile industry in the South has been established at 619 Rutherford St, Greenville, S C, by The Hilton-Davis Chemical Co, Division of Sterling Drug Inc, Cincinnati.

In addition to general offices in the building, the branch contains a service laboratory and facilities for storing, mixing, shipping and receiving various types of dyestuffs. The Greenville center will have available Spectrolenes, Spectrosols, naphthols, fast bases, fast color salts, Hiltone pigment and printing and padding colors, optical brighteners, and acid and basic dyes.

S Y Stribling III is manager of the Greenville branch. He is assisted by William S Pearson, with headquarters in Decatur, Ga.

• $18,000 in Scholarships Awarded by NETF

Winners of nine $2,000 scholarships for study at New England textile colleges have been named by the New England Textile Foundation.

Of this year's winners, two will attend the Rhode Island School of Design (Margot T Stevens and Rodney W Kingirski), one will attend New Bedford Institute of Textiles and Technology (Kenneth J Provost), and six have elected Lowell Technological Institute (Jack Raymond, Gerald J Smith, Robert A Munroe, David T Sullivan, Richard J Urbanek, and William C Wescott).

• Colgate-Palmolive Expansion

The Colgate-Palmolive Company announced on July 20th that it is increasing the size of its research and development pilot plant in Jersey City by 25 percent.

Two floors are being added to the four-story building, which was only recently completed. The pilot plant is devoted to the exploration of new processes and product development. The expansion is scheduled to be completed October 1st.

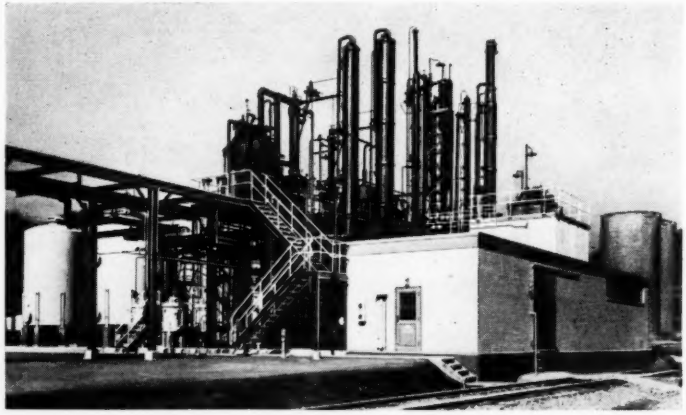
In addition, a separate storage building is being built to meet the needs of the pilot plant operation. The work is being carried out by Joseph Mitchell Inc, Jersey City N J.

• Wiesner-Rapp Names Japanese Representatives

The Wiesner-Rapp Company, Inc, Buffalo, N Y, has announced the appointment of Doitsu Kikai Boeki K K, No. 7 3-chome, Yaesu, Chuo-ku, Tokyo, as exclusive sales representative in Japan.

Doitsu Kikai Boeki K K will represent Wiesner-Rapp in the sale of continuous bleaching and finishing machinery consisting of J boxes, washers, saturators, soapers, scrays, squeezers, dye becks, a line of padders and the Barotor, in both laboratory and large production models.

The Osaka Office of Doitsu Kikai Boeki K K is No. 4, Sozecho, Kita-ku, Osaka.



This new unit for the commercial production of high purity grades of ethyl and methyl acrylates was recently completed at the Institute, W Va, plant of Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation. Production facilities of the new unit represent a substantial expansion of Carbide's previous capacity for the manufacture of these polymer and copolymer intermediates. This unit can also be used for production of other esters of acrylic acid.

• Alexander Smith to Close Yonkers Plant

The board of directors of Alexander Smith, Inc, has voted to discontinue permanently the operation of its carpet plant in Yonkers, New York, and to concentrate its production in its two other carpet plants in Greenville, Miss, and Philadelphia, Pa. The Greenville plant is completely new and is among the most modern in the carpet industry.

The decision to close the Yonkers plant permanently was attributed to the high cost of operation in the face of reduced demand, and the cumulative effect of continuing losses.

• GDGA Meeting

At a regular meeting of the Garment Dyers Guild of America on June 11th members and guests spent the morning at the Lawrence Jacobson Dye Works in Philadelphia, Pa.

Following the plant tour, the group adjourned to Beck's Restaurant for lunch. The balance of the afternoon was devoted to technical and panel discussions with particular emphasis on the identification and handling of some of the newer acrylic synthetics. John Parsley, R S Wilkinson and Percival Theel of the Philadelphia Textile Institute each addressed the assemblage.

The evening business meeting was held at the John Bartram Hotel.

• New Book on Sulfur

THE SULFUR DATA BOOK——*McGraw Hill Book Co, 330 W 42nd St, New York, N Y;* $3.00——A new compilation of technical data on sulfur compiled by Freeport Sulphur Co, this 140-page illustrated book includes material from literature, from private sources, and from practical experience.

Metallic yarns from "Mylar" polyester film.

• Metallic Yarn Among Numerous "Mylar" Applications

One of the latest products of Du Pont research, "Mylar" polyester film, which is finding application in a variety of industrial and home uses, is providing the textile industry with a tough nontarnishable, metallic yarn.

The yarn is said to withstand washing, pressing with a hot iron, and drycleaning. Its manufacture requires a special technique adhering, or laminating, a wide web of plastic film to both sides of aluminum foil with a clear adhesive. The result is a bright silver lamination. If a yellow-orange color is added to the adhesive, a gold effect is obtained. Depending on the color in the adhesive, a rainbow-variety of materials is possible. The sheet of colored film is then cut into rolls one inch in width. These are split into strips of yarn of the required size, often as small as 1/64th or 1/80th of an inch in width.

Such metallics are now being used for cocktail and evening dreses, raincoats, handbags, shoes, gloves, etc; and stripes in men's weskits. A variety of metallic yarns also are used in upholstery and drapery fabrics.

TECHNICAL LITERATURE

DEL PROTECTIVE COATING ——— *David E Long Corp, 220 E 42nd St, New York 17, N Y* ———Of chief interest among the new items listed in this 12-page booklet is DEL Primer P-9, which has been designed for use as a general maintenance primer on wire-brushed rusty metal or over old paints. Another new item is Catalyzed Epon, DEL White E-2 coating, which is designed to hold up under solvents.

DEWPRUF ———*F C Huyck & Sons, Rensselaer, N Y*———This booklet describes the most common conditions and indications of the presence of wool-destroying bacteria, and describes a new and effective treatment for its prevention.

FLUID-FLUID-EXTRACTION ——— *Dechema Deutsche Gesellschaft für chemisches Apparatewesen, Frankfurt/Main West 13, Germany; DM 18.24 to Dechema members, DM 22.80 to nonmembers* ——— The extraction of fluids is of increasing importance in chemical engineering, and this latest number of the "Dechema-Erfahrungsaustausch" series serves as a handy guide. A short survey of extraction processes is followed by detailed descriptions of individual extraction units. A further section contains all relevant basic calculations, illustrated by examples. Complete with references to current literature and index.———57 pages.

INDUSTRIAL TEXTILES DIRECTORY, 1954 EDITION ——— *Fairchild Publications, Inc, 7 East 12th St, New York 3, N Y; $3.00*——This 8" x 11" directory contains about 125,000 listings of resources for industrial fabrics and other cotton and synthetic textiles, fibers, yarns, and finishes.

INDUSTRIAL WASTE TREATMENT ——— *Bulletin WC-116, Graver Water Conditioning Co, 216 W 14th St, New York 11, N Y*———Advantages inherent in the treatment of industrial waste waters and process liquors are described. Schematic drawings, pictures, and a problem-solution-result type of explanation demonstrate how Graver equipment solves such problems as process and cooling water shortages, contamination of streams with plant effluents, and the loss of valuable heat and materials in discarded waters and process liquors.

TEN THOUSAND AND ONE CUSTOMER COMPLAINTS ——— *Mellon Institute, 4400 Fifth Ave, Pittsburgh 13, Pa*———This paper by Jules Labarthe, presented before the Annual Meeting of the Textile Research Institute and also before the Philadelphia Section of AATCC, is a reprint from *Textile Research Journal XXIV*, No. 4, April, 1954.

NAMES IN THE NEWS

A E Cleghorn

A E CLEGHORN has been named executive vice-president, National Aniline Division, Allied Chemical & Dye Corp, New York.

Associated with Allied Chemical since 1933, Mr Cleghorn has been with National Aniline Division since 1952, successively as assistant to the president and vice-president.

W W FRYMOYER has been elected a vice president of The Foxboro Company, Foxboro, Mass.

Since 1951 he has been factory manager and will continue in this capacity, supervising all instrument manufacturing activities of the company.

W W Frymoyer

JACK McNAB, junior partner of the Mac Chemical Co, Knoxville, Tenn, was seriously injured in an automobile accident on June 17th, and will be confined to a Knoxville hospital until the end of this month. The injuries consisted of broken ribs, cracked pelvis and broken hip. An operation on the hip was required.

CLETUS W SNIDER has joined Treesdale Laboratories and Textile Processing Company, Pittsburgh, as assistant to the president, JOHN A BEATTIE. Mr Snider comes to Treesdale from Canadian Cottons, Ltd, where he has been assistant superintendent.

Secretary of the Army ROBERT TEN BROECK STEVENS, former chairman of the board of J P Stevens Company, was awarded an honorary degree of Doctor of Textile Science during the annual commencement exercises of North Carolina State College recently.

The National Retail Dry Goods Association has designated IRWIN D WOLF, vice president and general manager, Kaufman Department Stores, Pittsburgh, to serve as chairman of the new American Standards Committee on "All Textiles," of which NRDGA is sponsor.

"All Textiles Committee" L25 (based on American Standards L22 for rayon and acetate) will develop specifications and test methods for end-use performance requirements for all textile fabrics made from natural and synthetic fibers used in the manufacture of all wearing apparel and home furnishings.

The North Star Woolen Mill Company has announced the election of ARTHUR C McEWEN, general manager since April 1953, to the office of executive vice-president. Mr McEwen will make his headquarters at the Company's mill in Lima, Ohio.

FRANK T ROBERTS, formerly with Carter Fabrics Division of J P Stevens & Co, Inc, has assumed the position of director of manufacturing of Robbins Mills, Inc, and is now located at the main manufacturing offices at Aberdeen, N C. Alfred H Grant, general manager of manufacturing, now reports to Mr Roberts.

GEORGE W PFEIFFENBERGER, former research director and technical mill consultant for the Otto Geodecke Co, Hallettsville, Tex, has joined the staff of the National Cotton Council.

ROY WALLACE has been named manager of the central sales district with headquarters in Cleveland, and JOHN H DREXLER will serve there as a special sales representative.

NATHAN R LUFKIN, former superintendent of printing at Bellman Brook Bleachery, Fairview, N J, is now assistant to Nelson Barlow, plant manager of the Apponaug Co, Apponaug, R I.

CLYDE T MOORE, formerly plant manager of the Cherow (S C) Finishing Plant of J P Stevens, has replaced ALLAN TAYLOR as plant manager of Robbins Mills' Clarksville (Va) Finishing Plant.

JAN H MOOLMAN, chairman of the International Wool Publicity and Research Fund, was re-elected chairman of the board of directors of The Wool Bureau, Inc., at the Bureau's annual meeting in New York recently. Mr Moolman is a resident of Middelburg, South Africa.

The Du Pont Company has announced the establishment of a new Organic Chemicals Department sales training section under EMORY M FANNING and assignment of WILLIAM A BOURS, III, as assistant sales director of the "Kinetic" Chemicals Division, replacing Mr Fanning.

FRANCIS L SHACKELFORD, JR, for the past year assistant sales development manager for the Rubber Chemicals Division has been named chemical sales manager of the Dyes and Chemicals Division, replacing Mr Bours.

VERNE NAZAREK, Houston sales representative, Chemical Division, Celanese Corp of America, has been transferred to New York as assistant to M S KIRPALANI, export manager of the Division.

JACK T D CORNWALL, formerly with Hazard Advertising Company, has been named advertising and sales promotion manager for Celanese's Chemical Division.

Further expansion of the Goodyear Tire and Rubber Company's Chemical Division has led to the assignment of GORDON H CAMPBELL to the Southeast sales district, with headquarters in Charlotte, N C, and that of ARTHUR MERRITT to the New England district, with headquarters in Hartford, Conn. Both men were in the company's organization at Akron, O, previously.

GENERAL CALENDAR

AMERICAN CHEMICAL SOCIETY
National Chemical Exposition—Oct 12-15, Chicago, Ill.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
Southern Textile Conference—Nov 4-5, North Carolina State College, Raleigh, N C.

AMERICAN SOCIETY FOR QUALITY CONTROL
Annual meeting, Textile Div—Jan 27-29, Clemson College School of Textiles.

CHAMBRE SYNDICALE TRAMAGRAS
International Detergent Congress—Aug 30-Sept 5, The Sorbonne, Paris, France.

DELTA KAPPA PHI FRATERNITY
1955 Annual Convention—April 29-30, Lowell, Mass.

DEUTSCHE GESELLSCHAFT FUR CHEMISCHES APPARATEWESEN
Achema XI—May 14-22, 1955, Frankfurt am Main, Germany.

THE FIBER SOCIETY
Fall Meeting—Sept 13-14, McGill University, Montreal, Canada.

Spring Meeting—May 4-5, 1955, Alabama Polytechnic Institute, Auburn, Alabama.

Fall Meeting—Sept 8-9, 1955, Massachusetts Institute of Technology, Cambridge, Mass.

INTERNATIONAL CONGRESS OF INDUSTRIAL CHEMISTRY
27th Congress—Sept 11-19, Brussels, Belgium.

INTERNATIONAL TEXTILE EXHIBITION
2nd Exhibition—June 25-July 10, 1955, Brussels, Belgium.

INTERNATIONAL WOOL TEXTILE RESEARCH CONFERENCE
September, 1955—Sydney, Melbourne, and Geelong, Australia.

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS, KNITTED OUTERWEAR ASSOCIATION, THE UNDERWEAR INSTITUTE
42nd Knitting Arts Exhibition—April 25-29, Convention Hall, Atlantic City, N J.

NATIONAL COTTON COUNCIL OF AMERICA
1954 Chemical Finishing Conference—Oct 7-8, Hotel Statler, Washington, D. C.

Annual Meeting—Jan 31-Feb 1, Hotel Shamrock, Houston, Tex.

Cotton Research Clinic—Feb 16-18, Pinehurst, N C.

NATIONAL INSTITUTE OF DRYCLEANING
4th Educational Conference—Dec 5-10, Silver Spring, Md.

NORTH CAROLINA TEXTILE MANUFACTURERS ASSOCIATION
48th Annual Meeting—Oct 14-15, The Carolina, Pinehurst, N C.

SOUTHERN TEXTILE EXPOSITION
October 4-9 (Textile Hall, Greenville, S C).

TEXTILE RESEARCH INSTITUTE
25th Annual Meeting—March 10-11, 1955, Hotel Commodore, New York, N Y.

TEXTILE TECHNICAL FEDERATION OF CANADA
4th Seminar—Sept 9-11, Queen's Univ, Kingston, Ont.

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